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**Chris Kaiser**  
Principal Advisor  
Environmental Operations Support  
Kennecott Utah Copper

Incoming  
m/035/002  
TASK 3452  
CC: Leslie  
Tom

RECEIVED  
MAR 24 2010  
DIV. OF OIL, GAS & MINING

Ms. Dana Dean, Associate Director - Mining  
Division of Oil, Gas & Mining  
Utah Department of Natural Resources  
P.O. Box 145801  
Salt Lake City, Utah 84114 - 5801

March 23, 2010

Attn: Mr. Paul Baker, Minerals Regulatory Program  
Ms. Leslie Heppler, Minerals Regulatory Program

Re: M/035/002  
Response to Division Letter March 2, 2010  
Deficient Submittal – Bingham Sediment Pond Drawing

Dear Ms. Dean:

Pursuant to the Division's letter dated March 2, 2010 (attached), please note the following Kennecott Utah Copper (KUC) responses:

**UDOGM Item 1:**

The submitted Figure 4 was a URS Corporation figure and not KUC figure.  
Changes are not warranted.

**UDOGM Item 2:**

The submitted Figure 4 was a URS Corporation figure and not KUC figure.  
Changes are not warranted.

**UDOGM Item 3:**

The submitted Figure 4 was from a URS report to KUC. It was provided to the Division as an informational item per Mr. Munson's request during the annual UDOGM / KUC Administrative Issues Meeting completed December 8, 2009.

**UDOGM Item 4:**

Attached as an information item for the Division is the URS Technical Memorandum prepared for KUC dated November 23, 2009. This technical analysis presents an understanding of the runoff and associated erosion volumes expected to reach the toe of the Bingham Canyon waste rock disposal area. KUC utilized this report to assist us in upgrading existing onsite sedimentation capture in this location (Scenario 2).

Further, while a sedimentation structure is intended to be left at this location post-closure, KUC will re-evaluate the existing operational-phase design and submit a final post-closure design for the Divisions review and approval for this and other sedimentation structures. Discussions of reclamation and land ownership in this area are premature.

Also, KUC does not believe that our submittal on December 21, 2009 was a "deficient submittal" given that it was an informational submittal to a very specific request from the Division.

Please contact me or Zeb Kenyon (801.569.6035) should you have any questions concerning this submittal.

Sincerely,



Chris Kaiser  
Principal Advisor, Environmental Operations Support



JON M. HUNTSMAN, JR.  
*Governor*

GARY R. HERBERT  
*Lieutenant Governor*

# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
*Executive Director*

### Division of Oil, Gas and Mining

JOHN R. BAZA  
*Division Director*

RECEIVED MAR - 9 2010

March 2, 2010

Rohan McGowan-Jackson  
Kennecott Utah Copper Corporation  
P.O. Box 6001  
Magna, Utah 84044-6001

Subject: Deficient Submittal – Bingham Sediment Pond Drawing, Kennecott Utah Copper, Bingham Canyon Mine, M/035/002, Salt Lake County, Utah

Dear Mr. McGowan-Jackson:

The Division has reviewed the Bingham Creek Sediment Pond Drawing received on December 21, 2009, and the following items will need to be addressed before the submittal can be determined complete:

1. Figure 4, Upper left drawing – Include scale on the upper left drawing, and not on the title bar for the sheet. (lah)
2. Figure 4, Include a map showing the location of the upper left figure in relationship to Bingham Pit (lah)
3. It is unclear which figure 4 is to be replaced. (lah)
4. Submit Design Storm Calculations. This should include the ability of structures (i.e. spillways, low flow pipes etc) to safely pass the design event. Also, describe how structure will be reclaimed. Include the post-reclamation elevations and configuration of the area around the impoundment. If the structures are to be left as part of the post mining land use, then describe how they will be free draining and stable and how natural drainage patterns will be restored. Please provide an agreement with the land owner or land managing agency if these structures are to remain. (TM)

Please submit the changes within the next 30 days, and provide your response as a replacement figure with replacement text for the NOI and the appropriate change to the Table of Contents with clear direction on which pages are to be removed and which pages are added.

If you have any questions regarding this letter, please call me at 801-538-5261, Leslie Heppler (lah) at 801-538-5257, or Tom Munson (TM) at 801-538-5321. In reply, please refer to file number M/035/0002. Thank you for your cooperation.

Sincerely,

Paul B. Baker  
Minerals Program Manager

PBB:lah:pb  
P:\GROUPS\MINERALS\WP\M035-SaltLake\M0350002-BinghamPit\final\rev1-3332-03022010.doc

**Date:** November 23, 2009

**To:** Zeb Kenyon  
KUC Environmental Engineer

**From:** Tom Wright P.E., Lizel Spencer, P.E.  
Rick J. Cox, P.E.

**Subject: Bingham Canyon Analysis**

This analysis has been developed to provide KUC with an understanding of the runoff and associated erosion volumes expected to reach the sedimentation basin at the base of Bingham Canyon. The analysis provides a concept design to contain and manage the flows and sediment loads defined by the provided scenarios. KUC will continue to actively dump overburden in this area and revegetate to an elevation of 6390. If mining activities were extended beyond the current life-of-mine plan, Bingham Canyon dump could ultimately be built to an elevation of 7390.

Currently, KUC is constructing a final 2.75:1 waste rock face in Bingham Canyon. The toe of the slope is at elevation 5540 and the top of the reclaimed and vegetated slope will be 6390. Depending upon long term mining options, there are plans for additional consecutive 200 foot lifts above 6390 to 7390, with a benched topography.

This evaluation considers sedimentation basin capacity for three scenarios.

1. An un-vegetated dump face from elevations 5540 to 6390 and evaluates for a 10-year, 24-hour storm on a 2.75:1 slope.
2. A reclaimed and vegetated dump face from elevations 5540 to 6390 for a 100-year storm on a 2.75:1 reclaimed, vegetated slope.
3. A 100-year storm on the life-of-mine dump area above 6390 with an un-vegetated surface from 6390 to 7390.

An existing large upper pond at approximately elevation 6290 on the south side of the dumps is modeled to receive water from slopes above 6390, providing additional stormwater detention. An existing lower pond is redesigned to handle each of the scenarios. Refer to Figures 1 and 2 for maps showing the watersheds modeled. Table 1 summarizes the modeling results.

**Table 1 – Summary Table**

	<b>Location/Event</b>	<b>Peak Inflow</b>	<b>Peak Outflow</b>	<b>Sediment Inflow</b>	<b>Sediment Outflow</b>
Scenario 1	Lower Pond 10yr/24hr	23.44 cfs 10,501 gpm	5.7cfs <sup>1</sup> 2558.3 gpm	2,172 tons 975.2 CYDS	40.5 tons <sup>2</sup> 18 CYDS
Scenario 2	Lower Pond 100yr/24hr	11.27 cfs 5,049 gpm	3.99 cfs <sup>1</sup> 1790.8 gpm	288.6 tons 129.6CYDS	18.9 tons <sup>2</sup> 8.5 CYDS
Scenario 3	Upper Pond 100yr/24hr	202.9 cfs 90,913 gpm	6.49 cfs <sup>2</sup> 3994.6 gpm	21,938 tons 9,849 CYDS	150.8 tons <sup>2</sup> 67.7 CYDS

<sup>1</sup>Volume reporting to lower sedimentation pond

<sup>2</sup> Volume reporting to channel below lower sedimentation pond

**Hydrology and Sediment Parameters**

**Modeling Investigation:**

For this analysis, SEDCAD<sup>4</sup> (SEDCAD) was used for both runoff and sediment analyses. The input parameter requirements for the SEDCAD model can be found in the SEDCAD model reports

located in Attachment B. Required input variables include: rainfall data, parameters for the Revised Universal Soil Loss Equation (RUSLE) to determine sediment loss after storm events, an Eroded Particle Size Distribution (EPSD) to route sediment through the proposed ponds, and Curve Numbers (CN) to describe the land types to develop peak rainfall runoff flows.

Table 2 summarizes the weighted CN values used in the SEDCAD model.

Table 2 Weighted CN Values					
Basin	Total Area (acres)	Area (acres)	Land Use	CN	Weighted CN
Scenario 1					
E	35	27	Mine Impacted	82	76
		8	Native	56	
H	250	155	Unveg. Waste Rock	80	71
		1	Mine Impacted	82	
		93	Native	56	
I	231	1	Unveg. Waste Rock	80	57
		11	Mine Impacted	82	
		219	Native	56	
Scenario 2					
E	35	27	Mine Impacted	82	76
		8	Native	56	
H	250	155	Veg. Waste Rock	56	56
		1	Mine Impacted	82	
		93	Native	56	
I	231	1	Unveg. Waste Rock	80	57
		11	Mine Impacted	82	
		219	Native	56	
Scenario 3					
E2	438	438	Veg. Waste Rock	56	56
		155	Veg. Waste Rock	56	
H	250	1	Mine Impacted	82	56
		93	Native	56	
		1	Unveg. Waste Rock	80	
I	231	11	Mine Impacted	82	57
		219	Native	56	

Basins A,B, C,D, F and G are part of the overall Bingham Canyon basin but do not contribute to the sediment basin and were not modeled.

CN Values are based on the different land types found throughout the project as determined by the aerial photography acquired in August 2008. These values are weighted based on the percentage of watershed area that are vegetated or non-vegetated dump face, native ground, as well as mine disturbed area. Mine disturbed area is considered all locations where mine activity (e.g., haul roads, maintenance roads, waste rock dump flat tops) is taking place and no reclamation effort has been completed or modeled.

The analysis was based on the following hydrologic data gathered from the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14. Precipitation depths were used for the 10 and 100-year, 24-hour storms. An expanded version of the table is provided in Table 3:

**Table 3 Precipitation Frequency Estimates (inches)**

AEP* (1-in-Y)	5 min	10 min	15 min	30 min	1 hr	2 hr	3 hr	6 hr	12 hr	24 hr	48 hr	4 day
<b>2</b>	0.15	0.23	0.28	0.38	0.47	0.59	0.68	0.89	1.15	1.39	1.61	1.89
<b>5</b>	0.22	0.34	0.42	0.56	0.70	0.83	0.92	1.17	1.50	1.81	2.10	2.50
<b>10</b>	0.28	0.43	0.53	0.71	0.88	1.02	1.12	1.38	1.74	<b>2.09</b>	2.44	2.92
<b>25</b>	0.37	0.56	0.70	0.94	1.16	1.32	1.41	1.67	2.08	2.44	2.87	3.48
<b>50</b>	0.45	0.69	0.85	1.15	1.42	1.60	1.66	1.90	2.35	2.71	3.21	3.92
<b>100</b>	0.55	0.83	1.03	1.39	1.72	1.91	1.97	2.17	2.63	<b>2.98</b>	3.55	4.37
<b>200</b>	0.66	1.00	1.25	1.68	2.07	2.28	2.34	2.50	2.96	3.26	3.90	4.84
<b>500</b>	0.84	1.28	1.58	2.13	2.64	2.88	2.94	3.09	3.48	3.61	4.37	5.49
<b>1000</b>	1.00	1.53	1.89	2.55	3.16	3.43	3.48	3.61	3.91	3.95	4.73	6.00

Values in bold are those used in the analysis.

The above table may be used by KUC to bracket past and future storms.

Drainage areas and flow patterns were determined using mine topography generated from the August 2008 flyover. In addition, a site visit was conducted to confirm basin delineation. KUC staff also provided feedback regarding the basin delineations. For Scenario 3 KUC provided waste rock dump topography as modeled for extending the mine life past the current plan. Figures 1 and 2 (Attachment A) show these basin delineations based on the available information.

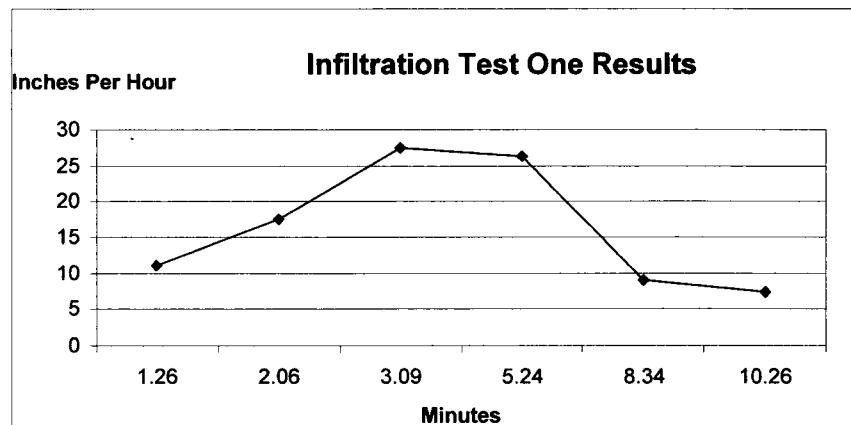
#### Field Investigation

The eroded particle size distribution (EPSD) was determined in a laboratory from an eroded material sample taken at the inlet to an access road cross culvert. This soil gradation is used by SEDCAD to route sediment through basins and other outlet works and is included as 6/30/09 data in Attachment D.

#### Infiltration Rates and Hydrologic Soil Group Selection

Four percolation tests were conducted on the face of the re-contoured and vegetated wasterock dumps in Bingham Canyon. The grade of slope in the test area averages 2.75:1. The soil, which may be referred to as growth media at a depth between 18 and 36 inches, is placed atop run of mine waste rock. Because of soil variability and difficulty in performing tests, it is typical for percolation tests to experience high frequencies of poor results, requiring judgment to discard outlier data. Two of the four percolation tests produced unusable results. One outlier was an extremely high percolation rate and the other extremely low. The remaining two tests produced results that best represented the anticipated infiltration rate for the soil.

The percolation tests were a constant head test using a 5.75-inch cylinder. The adjacent graph illustrates that



Test 1 has a very good saturation curve, receding to a near constant percolation. Extrapolating this data to 15 minutes provides an infiltration rate of 3.22 inches/hour (3-inches of head) or 0.41 inches/hour (1 cm/head). The second test (Test 2) resulted in an infiltration rate of 0.7 inches/hour. These results correspond to a hydrologic Group A soil (0.30 in/hr or high) which is highly permeable, representative of deep, well to excessively drained sand or gravel.

The infiltration Test 1 results corresponds well with the gradation analysis for eroded materials collected downgradient from the test. It is described as clayey, sandy gravel with less than 15% fines (See Attachment D Particle Size Analysis, dated 6/30/09, Sample 2). However, this sample is not from material from the reclaimed dump face.

The gradation for Test 2, with the higher infiltration rate, shows a material with over 40 percent fines.(See Attachment D, Particle Size Analysis, dated 8/17/2009) This is inconsistent with the Test 2 percolation results and indicates that the material at the surface of the dump face has not experienced sufficient consolidation to produce expected percolation test results.

However, this infiltration data was used to select the hydrologic soil group for the dump face. Because the results were inconsistent and the material may not have consolidated following placement, hydrologic soil Group B was selected as a conservative, reasonable representative soil type. Group B is described in TR-55 as "moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures".

## **Hydrologic Results**

For this analysis, it is assumed that all runoff from the wasterock face above elevation 6390 for all scenarios is, or will be, routed through the Upper Pond (See Figure 2, Attachment A). The Upper Pond has an existing total storage capacity of approximately 63 acre-feet, which is more than sufficient to either detain or retain runoff from the contributing areas as defined by scenario 3.

Drainage Basin I contributes runoff to the North Basin. It has a storage capacity of approximately 9 acre-feet. The North Basin adequately retains the inflows for all three scenarios without discharging to the Lower Basin.

Scenario 1. The peak flow for the 10-yr/24hr storm event at the bottom of the wasterock pile is 23.4 cfs. This is the flow contributing to the Lower Pond from drainage Basin H as shown in Figure 1, Attachment A. The model assumption is that the existing reclamation re-vegetation remains in place but future expansion is not vegetated.

Scenario 2. The peak flow at the bottom of the wasterock pile is 11.3 cfs. The entire face is revegetated in this scenario and the storm event is 100-yr/24 hr.

Scenario 3. Contributing inflow from areas above elevation 6390 are routed into the Upper Pond. Inflow to the pond is 202 cfs and approximately 21,938 tons of sediment. The discharge is only 6.5 cfs from the Upper Pond to the Bingham Canyon channel below the Lower Pond. The design pipe for discharging the 6.5 cfs from the Upper Pond to the channel below the Lower Pond is a 15 inch HDPE pipe. The total sediment leaving the Upper Pond is 150.8 tons/ 67.7 cubic yards.

## **Conceptual Pond Design**

The Bingham Canyon lower pond is designed as two separate containments divided by an angular rock berm (See Figures 3 and 4, Attachment A). The rock berm D50 size is 6 inches. The D50 refers to the median diameter of the stone. This is the size for which 50 percent, by weight, will

be smaller and 50 percent will be larger. The rock size should not vary by more than 1.5 times the D<sub>50</sub> diameter. The berm will contain the initial flow, allowing sediment to settle out as clearer water filters through the berm and overtops the barrier. The first sediment basin acts as a forebay, retaining the sediment while decanting clearer water. This area is defined by the volume contained behind the crest of the rock berm.

The volume of the second pond is defined by the height of the pond outlet structure, a broad crested weir overflow. The embankment may be constructed of finer material found in the basin, provided that a riprapped overflow is included to prevent headcutting or erosion of the downstream face. Design criteria for the concrete outlet structure vary depending on the scenario, but in general the structure consists of a concrete box structure with 12-inch orifice acting as overflows. An existing 4-inch low flow orifice will be used to prevent ponding during minor storm events. Higher flows that can't pass through the pipes can overflow into the concrete box structure through a grated cover.

The design of the rock berm height is controlled by the volume of sediment deposited during each scenario run. During the storm event considered, the volume of the pond upstream from the rock berm (forebay) was designed to provide the required volume to allow the sediment to settle out. The bay downstream of the rock berm is created by the overflow weir and includes area above the top of the rock berm. This bay detains the peak flows and passes suspended sediment through the outlet structure.

The following table describes the sediment and stormwater capacities of the ponds for the three scenarios. It summarizes the components of the pond and the rough earthwork quantities required to achieve the recommended volumes and weir heights.

Table 3: Lower Pond Configuration

			Forebay Pond		Outlet Pond					
	Cut Volume (cy)	Fill Volume (cy)	Rock Berm Volume (cy)	Rock Berm Height (ft)	Orifice 1 Size (in)	Orifice 1 Height (ft)	Low Flow Orifice Size (in)	Low Flow Orifice Height (ft)	Box Height (ft)	Outfall Pipe Size (in)
Scenario 1	895	611	475	5516	12	5517	4	5508.5	5519	10
Scenario 2	895	611	280	5514	12	5517	4	5508.5	5519	10
Scenario 3*	*No design for Upper Pond, modeled as existing. Lower Pond is same as Scenario 2.									

Table 4 summarizes the performance of the Lower Pond to detain water and sediment and shows resulting outflows from the structures.

Table 4: Lower Pond Performance

	Forebay Pond Capacity (cy)	Outlet Pond Capacity (cy)	Total Capacity (af)	Sediment In (tons)	Sediment In (CYDS)	Sediment Out (tons)	Sediment Out (CYDS)	Peak Flow In (cfs)	Peak Flow Out (cfs)
Scenario 1	3025	6425	5.9	2172.3	975.2	40.5	18.0	23.4	5.7
Scenario 2	1415	8035	5.9	288.6	129.6	18.9	8.5	11.3	3.9
Scenario 3*	NA	NA	NA	21938	9848.7	150.8	67.7	202.9	6.5

\* Specific to Upper Pond

Refer to Figures 3 and 4, Attachment A for plans for the ponds for the three scenarios. These figures include the contours for each pond and sizes for structures and discharge pipes. Attachment B of this memorandum includes:

1. SEDCAD model results (hydrology and sediment)
2. Visual Urban model results (pipe sizing for pond discharge lines)

## Sedimentation Bench Design

Because Scenario 3 model demonstrates that the Upper Pond is more than adequate to retain water and control sediment from the proposed benched areas above elevation 6390, the effects of benching was not included in the base model. However, in order to understand the benefits of benching, a single bench was modeled for the 10-yr/24-hr event to determine the sediment storage capacity of each bench. For this separate model, the geometry selected was as follows:

Height of sloped face: 200 ft

Horizontal distance of sloped face: 185 ft.

Bench width: 80 ft.

Typical bench length 6000 ft.

Storage based on bench rising 2 feet from toe of slope to edge of bench.

Based on this geometry and previously described hydrology and soil parameters, a bench will have sufficient storage to contain the sediment resulting from twenty (20) 10-yr/24-hr events.

## Recommendation

We recommend implementation of improvements as shown for Scenario 2 (100-year capacity). The reason for this recommendation is that the Upper Pond is sufficient for sediment and stormwater detention for Scenario 3. Also, Scenario 1 assumes no revegetation of the upper reaches of wasterock pile and has only a 10-year storm capacity.

It is recommended that sediment collected by the basin be removed following any significant storm event that appears to have reduced its capacity by more than 10 percent. This approximates the sediment deposited by a 100-yr event with the dump face vegetated. It would not need to be removed after every storm event. A good indicator would be when sediment depth reaches elevation 5511.25 or 1.25 ft of depth.

### Attachments:

A - Figures 1 through 4

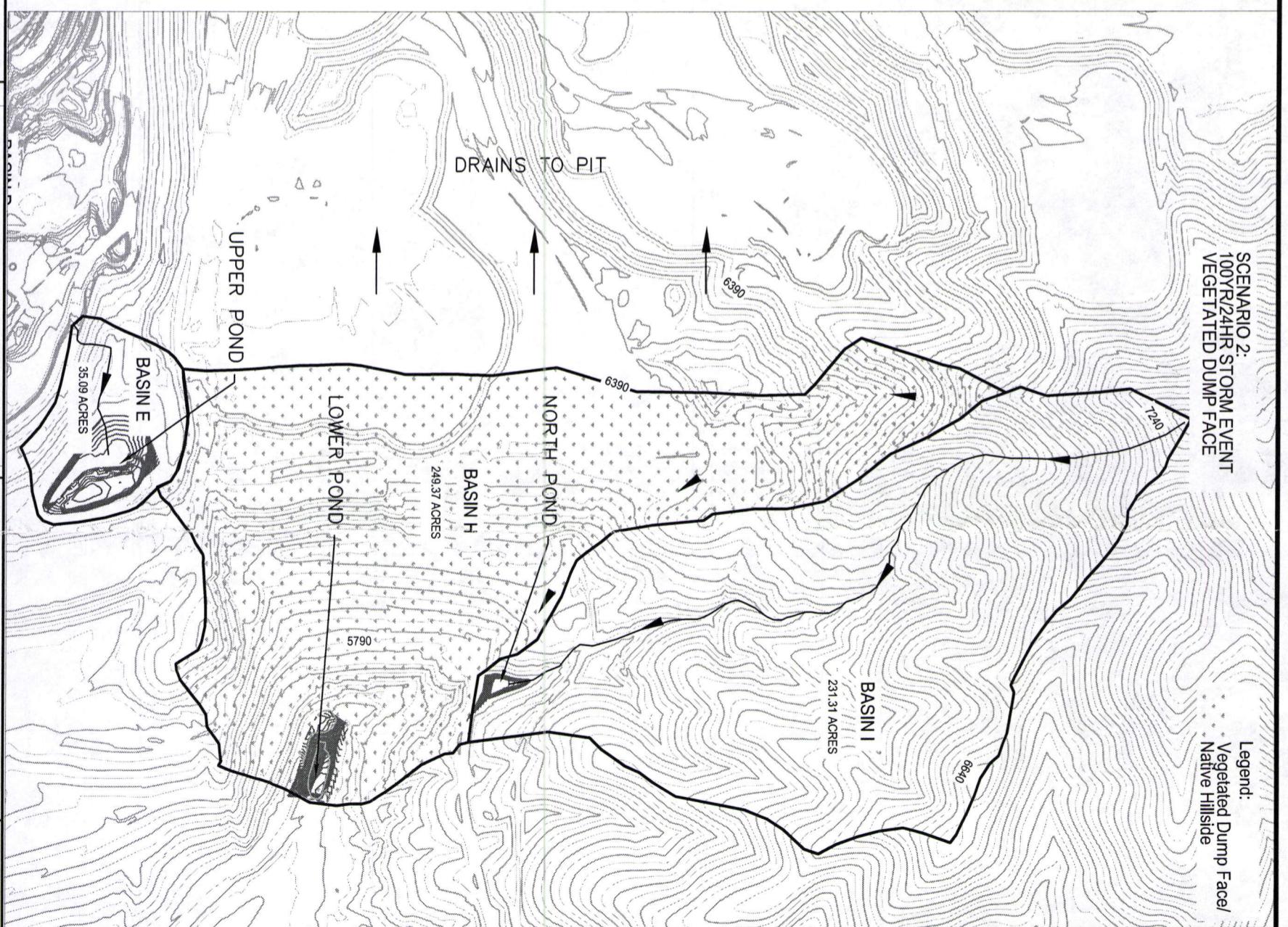
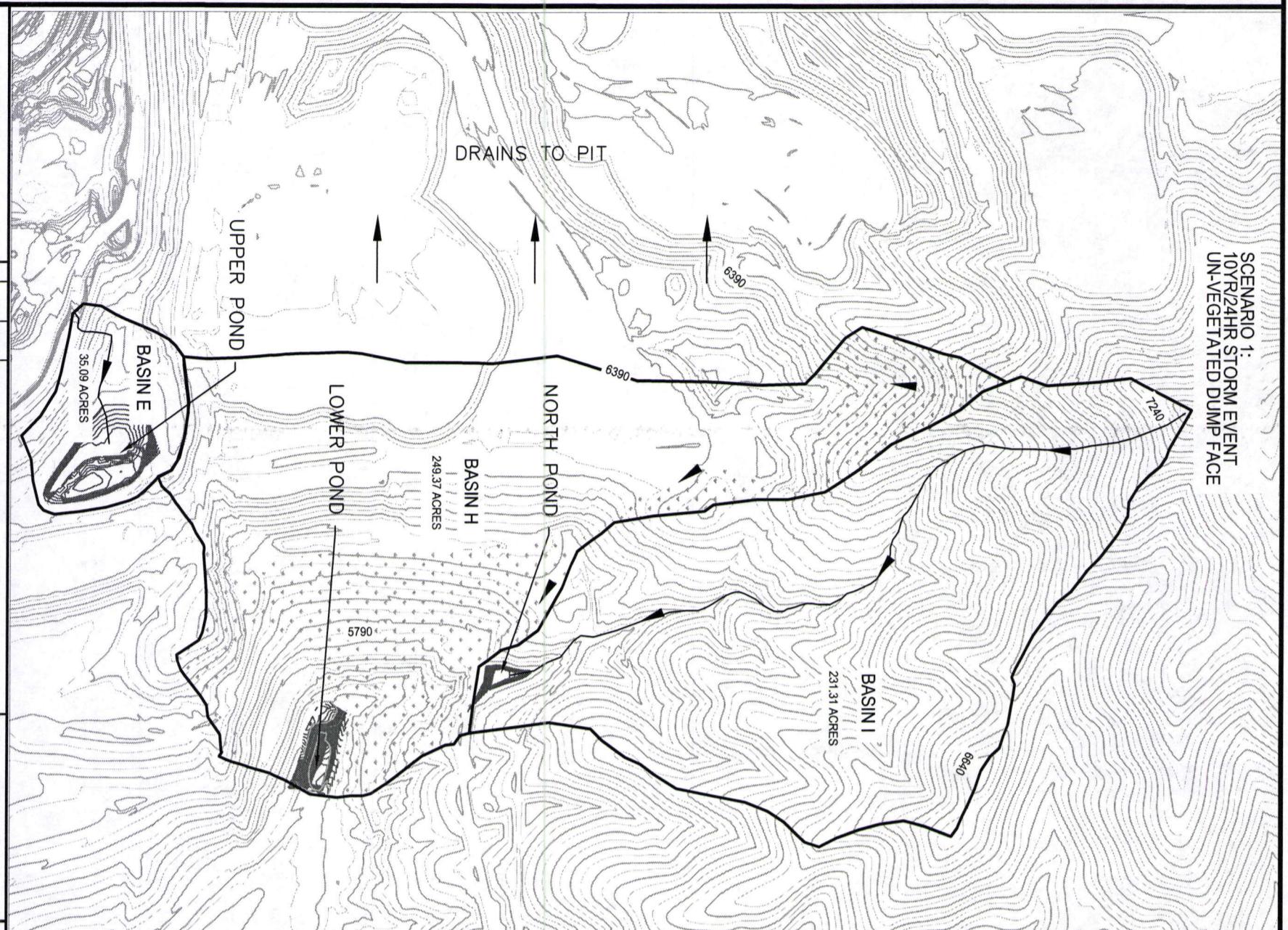
B - SEDCAD Model Results (4 runs)

C - Visual Urban Model Results (3 pipe sizes)

D - IGES Particle Size Distribution Reports on 6/30/09 (2) and IGES Particle Size Distribution Report on 8/17/09 (1)

END OF MEMORANDUM

SCENARIO 1:  
10YR/24HR STORM EVENT  
UN-VEGETATED DUMP FACE



SCENARIO 2:  
100YR/24HR STORM EVENT  
VEGETATED DUMP FACE

Legend:  
\* Vegetated Dump Face/  
Native Hillside


**URS**

T6 E WINCHESTER STREET  
SALT LAKE CITY, UT 84117  
PH: (800) 994-4000

Design By:	Tom Wright	Date:	
Drawn By:	Brian Rod	9-25-09	
Checked By:	Rick Cox	9-25-09	
Approved By:	-		

REVISIONS

REMARKS

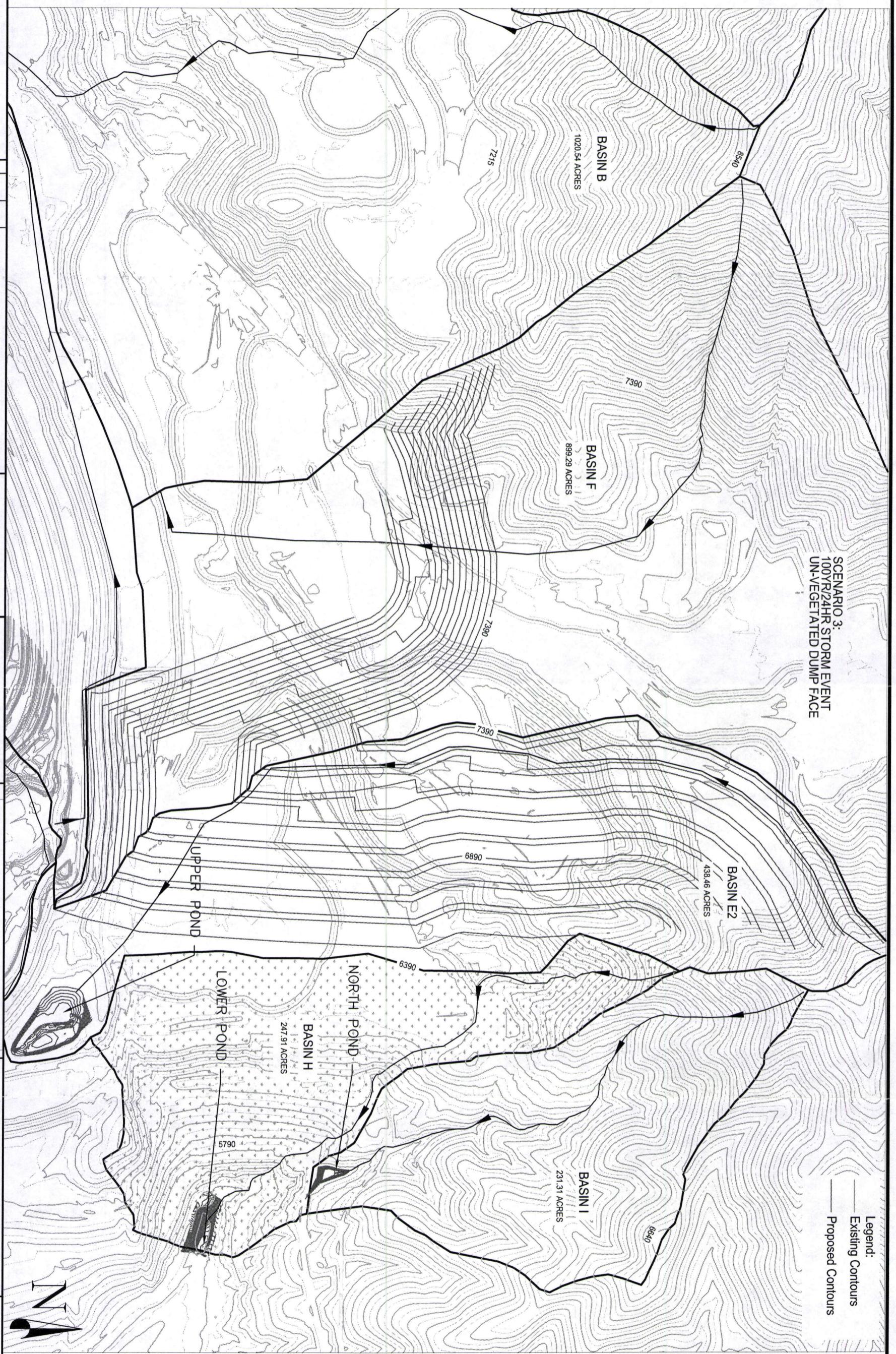
KENNECOTT UTAH COPPER CORPORATION  
BINGHAM SEDIMENT PONDS  
SCENARIO 1 & 2

FIGURE 1

KENNECOTT UTAH COPPER CORPORATION  
BINGHAM SEDIMENT PONDS  
SCENARIO 1 & 2


SCENARIO 3:  
100YR/24HR STORM EVENT  
UN-VEGETATED DUMP FACE

Legend:  
 Existing Contours  
 Proposed Contours



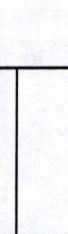
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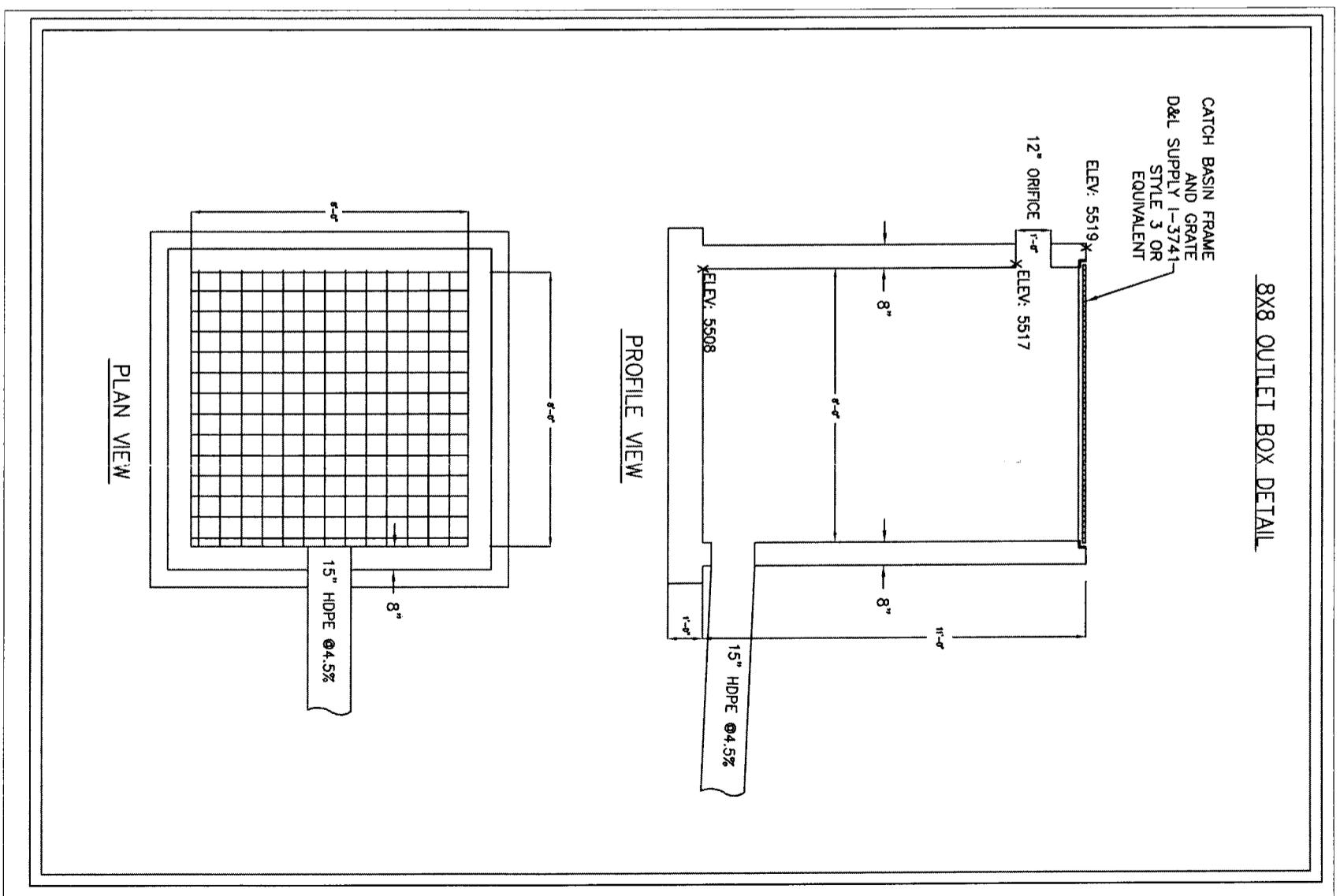
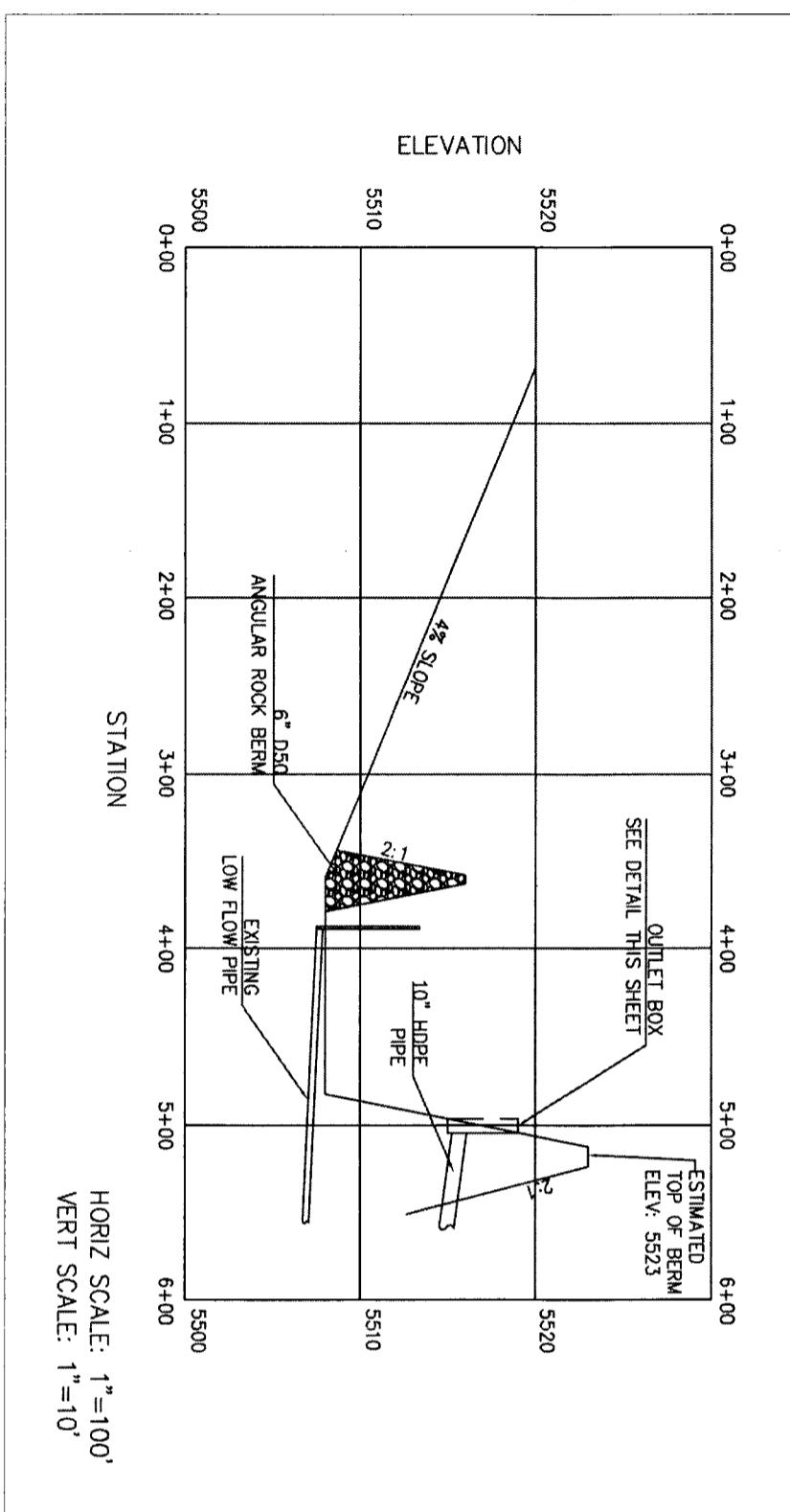
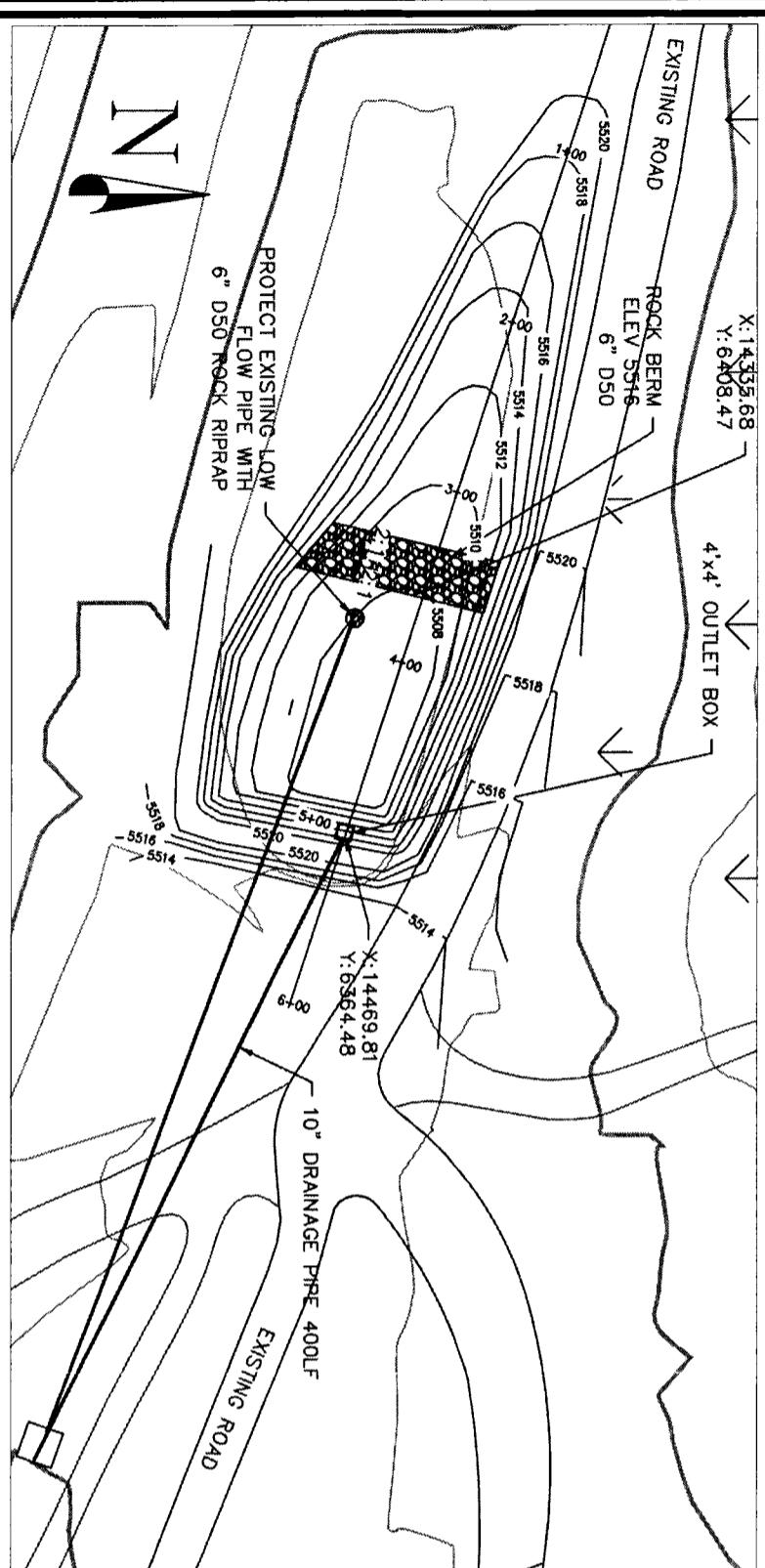
REVISIONS	

REMARKS	

URS	
Design By:	Tom Wright
Date:	8-28-09
Drawn By:	Beth Rood
Checked By:	Rick Cox
Approved By:	—
Scale: 1=1000'	

FIGURE 2  
KENNECOTT UTAH COPPER CORPORATION  
BINGHAM SEDIMENT PONDS  
SCENARIO 3







## **Bingham Sedimentation Pond**

### **Scenario I**

***This Scenario looks at the 10-year, 24-hour storm contributing to the ponds tributary to the Bingham Canyon reclamation effort.***

***All proposed and existing waste rock faces remain unvegetated for this scenario. All runoff west of the bench elevation 6390 travels to the pit.***

Lizel Spencer

# SEDCAD 4 for Windows

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## ***General Information***

### ***Storm Information:***

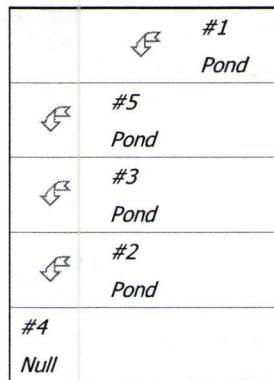
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	2.090 inches

### ***Particle Size Distribution:***

Size (mm)	Eroded Material
19.0000	100.000%
9.5000	97.700%
4.7500	90.600%
2.0000	81.900%
0.8500	71.700%
0.4250	63.600%
0.2500	57.500%
0.1500	51.500%
0.0750	42.900%
0.0638	39.480%
0.0460	36.300%
0.0331	33.110%
0.0214	29.290%
0.0125	27.380%
0.0089	25.470%
0.0063	24.200%
0.0045	21.010%
0.0031	17.830%
0.0022	15.280%
0.0012	13.370%

***Structure Networking:***

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#5	0.000	0.000	Lower Pond Sediment
Pond	#2	==>	#4	0.000	0.000	Upper Pond
Pond	#3	==>	#4	0.000	0.000	Basin I Pond
Null	#4	==>	End	0.000	0.000	
Pond	#5	==>	#4	0.000	0.000	Lower Pond Detention



# SEDCAD 4 for Windows

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## Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In Out	249.370	249.370	23.44 11.76	6.23 3.86	2,172.3 40.5	355,997 11,414	126.41 0.00
#5	In Out	0.000	249.370	11.76 5.66	3.86 3.84	40.5 40.4	11,410 10,747	0.00 0.00
#3	In Out	231.310	231.310	1.00 0.00	0.79 0.00	117.2 117.2	114,924 0	66.02 0.00
#2	In Out	35.085	35.085	12.10 0.00	1.34 0.00	211.0 211.0	209,260 0	109.47 0.00
#4		248.850	764.615	53.07	14.84	1,516.2	119,073	57.32 27.51

***Particle Size Distribution(s) at Each Structure******Structure #1 (Lower Pond Sediment):***

Size (mm)	In	Out
19.0000	100.000%	100.000%
9.5000	100.000%	100.000%
4.7500	100.000%	100.000%
2.0000	100.000%	100.000%
0.8500	100.000%	100.000%
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	100.000%	100.000%
0.0750	89.000%	100.000%
0.0638	81.904%	100.000%
0.0460	75.307%	100.000%
0.0331	68.689%	100.000%
0.0214	60.764%	100.000%
0.0125	56.802%	100.000%
0.0089	52.840%	100.000%
0.0063	50.205%	100.000%
0.0045	43.587%	100.000%
0.0031	36.990%	100.000%
0.0022	31.700%	100.000%
0.0012	27.737%	100.000%

***Structure #5 (Lower Pond Detention):***

Size (mm)	In	Out
19.0000	100.000%	100.000%
9.5000	100.000%	100.000%
4.7500	100.000%	100.000%
2.0000	100.000%	100.000%
0.8500	100.000%	100.000%
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	100.000%	100.000%
0.0750	100.000%	100.000%
0.0638	100.000%	100.000%

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Size (mm)	In	Out
0.0460	100.000%	100.000%
0.0331	100.000%	100.000%
0.0214	100.000%	100.000%
0.0125	100.000%	100.000%
0.0089	100.000%	100.000%
0.0063	100.000%	100.000%
0.0045	100.000%	100.000%
0.0031	100.000%	100.000%
0.0022	100.000%	100.000%
0.0012	100.000%	100.000%

## ***Structure #3 (Basin I Pond):***

Size (mm)	In	Out
19.0000	100.000%	0.000%
9.5000	100.000%	0.000%
4.7500	94.345%	0.000%
2.0000	85.285%	0.000%
0.8500	74.664%	0.000%
0.4250	66.229%	0.000%
0.2500	59.877%	0.000%
0.1500	53.629%	0.000%
0.0750	44.673%	0.000%
0.0638	41.112%	0.000%
0.0460	37.800%	0.000%
0.0331	34.479%	0.000%
0.0214	30.501%	0.000%
0.0125	28.512%	0.000%
0.0089	26.523%	0.000%
0.0063	25.200%	0.000%
0.0045	21.878%	0.000%
0.0031	18.567%	0.000%
0.0022	15.912%	0.000%
0.0012	13.923%	0.000%

## ***Structure #2 (Upper Pond):***

Size (mm)	In	Out
19.0000	100.000%	0.000%
9.5000	100.000%	0.000%
4.7500	100.000%	0.000%
2.0000	100.000%	0.000%
0.8500	91.792%	0.000%

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Size (mm)	In	Out
0.4250	81.423%	0.000%
0.2500	73.613%	0.000%
0.1500	65.932%	0.000%
0.0750	54.922%	0.000%
0.0638	50.543%	0.000%
0.0460	46.472%	0.000%
0.0331	42.388%	0.000%
0.0214	37.498%	0.000%
0.0125	35.053%	0.000%
0.0089	32.607%	0.000%
0.0063	30.982%	0.000%
0.0045	26.898%	0.000%
0.0031	22.826%	0.000%
0.0022	19.562%	0.000%
0.0012	17.117%	0.000%

## ***Structure #4:***

Size (mm)	In/Out
19.0000	78.353%
9.5000	78.353%
4.7500	78.353%
2.0000	78.353%
0.8500	78.353%
0.4250	78.353%
0.2500	78.353%
0.1500	73.488%
0.0750	61.661%
0.0638	56.958%
0.0460	52.585%
0.0331	48.199%
0.0214	42.946%
0.0125	40.319%
0.0089	37.692%
0.0063	35.946%
0.0045	31.559%
0.0031	27.186%
0.0022	23.679%
0.0012	21.053%

***Structure Detail:***Structure #1 (Pond)*Lower Pond Sediment*

Pond Inputs:

Initial Pool Elev:	5,508.10 ft
Initial Pool:	0.01 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

*\*Sediment capacity based on Average Annual R of 0.0 for 1 year(s)*Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
50.00	5,516.00

Pond Results:

Peak Elevation:	5,516.11 ft
H'graph Detention Time:	1.94 hrs
Pond Model:	CSTRS
Dewater Time:	0.50 days
Trap Efficiency:	98.14 %

*Dewatering time is calculated from peak stage to lowest spillway*Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,508.00	0.095	0.000	0.000	Top of Sed. Storage
5,508.10	0.099	0.010	0.000	
5,508.50	0.118	0.053	0.000	
5,509.00	0.143	0.118	0.000	
5,509.50	0.171	0.197	0.000	
5,510.00	0.202	0.290	0.000	
5,510.50	0.224	0.397	0.000	
5,510.91	0.244	0.493	0.000	
5,511.00	0.248	0.515	0.000	
5,511.50	0.273	0.645	0.000	
5,512.00	0.299	0.788	0.000	
5,512.50	0.323	0.943	0.000	
5,513.00	0.348	1.111	0.000	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,513.50	0.374	1.291	0.000	
5,513.63	0.381	1.340	0.000	
5,514.00	0.400	1.485	0.000	
5,514.50	0.423	1.691	0.000	
5,515.00	0.446	1.908	0.000	
5,515.50	0.469	2.136	0.000	
5,516.00	0.493	2.377	0.000	Spillway #1
5,516.11	0.500	2.432	11.763	12.10 Peak Stage
5,516.50	0.520	2.630	54.571	
5,517.00	0.547	2.897	154.350	
5,517.49	0.574	3.171	280.794	
5,517.50	0.574	3.177	283.559	
5,517.90	0.597	3.411	404.207	
5,518.00	0.602	3.471	436.568	
5,518.50	0.634	3.780	610.122	
5,519.00	0.666	4.105	802.026	
5,519.50	0.700	4.447	1,010.668	
5,519.90	0.727	4.732	1,188.741	
5,520.00	0.734	4.805	1,234.800	

Detailed Discharge Table

Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,508.00	0.000	0.000
5,508.10	0.000	0.000
5,508.50	0.000	0.000
5,509.00	0.000	0.000
5,509.50	0.000	0.000
5,510.00	0.000	0.000
5,510.50	0.000	0.000
5,510.91	0.000	0.000
5,511.00	0.000	0.000
5,511.50	0.000	0.000
5,512.00	0.000	0.000
5,512.50	0.000	0.000
5,513.00	0.000	0.000
5,513.50	0.000	0.000
5,513.63	0.000	0.000
5,514.00	0.000	0.000

Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,514.50	0.000	0.000
5,515.00	0.000	0.000
5,515.50	0.000	0.000
5,516.00	0.000	0.000
5,516.50	54.571	54.571
5,517.00	154.350	154.350
5,517.49	280.794	280.794
5,517.50	283.559	283.559
5,517.90	404.207	404.207
5,518.00	436.568	436.568
5,518.50	610.122	610.122
5,519.00	802.026	802.026
5,519.50	1,010.668	1,010.668
5,519.90	1,188.741	1,188.741
5,520.00	1,234.800	1,234.800

### Structure #5 (Pond)

#### *Lower Pond Detention*

##### Pond Inputs:

Initial Pool Elev:	5,508.10 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

*\*Sediment capacity based on Average Annual R of 0.0 for 1 year(s)*

#### Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,519.00

#### Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
12.00	7.00	12.00	2.00	4.70	0.0150	5,517.00

#### Drop Inlet

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Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
4.00	0.50	4.00	2.00	4.70	0.0150	5,508.50

## Pond Results:

Peak Elevation:	5,518.33 ft
H'graph Detention Time:	2.77 hrs
Pond Model:	CSTRS
Dewater Time:	0.94 days
Trap Efficiency:	0.05 %

*Dewatering time is calculated from peak stage to lowest spillway*

## Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,508.00	0.036	0.000	0.000		Top of Sed. Storage
5,508.10	0.037	0.004	0.000		
5,508.50	0.042	0.019	0.000		Spillway #3
5,509.00	0.048	0.042	0.297	3.70	
5,509.50	0.055	0.067	0.420	0.90	
5,509.84	0.059	0.087	0.486	0.50	
5,510.00	0.062	0.097	0.515	0.25	
5,510.50	0.065	0.128	0.594	0.70	
5,511.00	0.068	0.161	0.664	0.60	
5,511.08	0.068	0.167	0.675	0.10	
5,511.50	0.071	0.196	0.728	0.50	
5,512.00	0.074	0.232	0.786	0.60	
5,512.50	0.077	0.270	0.840	0.55	
5,513.00	0.080	0.309	0.891	0.55	
5,513.50	0.083	0.350	0.940	0.55	
5,513.76	0.085	0.372	0.964	0.30	
5,513.77	0.085	0.373	0.965		
5,513.78	0.085	0.374	0.965		
5,514.00	0.086	0.393	0.985	0.25	
5,514.50	0.088	0.436	1.029	0.50	
5,515.00	0.090	0.481	1.071	0.50	
5,515.50	0.093	0.527	1.112	0.55	
5,516.00	0.095	0.574	1.151	0.50	
5,516.50	0.098	0.622	1.188	0.50	
5,517.00	0.102	0.672	1.225	0.65	Spillway #2
5,517.50	0.105	0.723	3.935	6.50	
5,518.00	0.109	0.777	5.077	1.80	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,518.33	0.111	0.813	5.661	1.10	Peak Stage
5,518.50	0.112	0.832	5.960		
5,519.00	0.115	0.889	6.710		Spillway #1
5,519.50	0.118	0.947	18.287		
5,520.00	0.122	1.007	38.845		
5,520.10	0.902	1.052	43.704		

Detailed Discharge Table

Elevation (ft)	Broad- crested Weir (cfs)	Drop Inlet (cfs)	Drop Inlet (cfs)	Combined Total Discharge (cfs)
5,508.00	0.000	0.000	0.000	0.000
5,508.10	0.000	0.000	0.000	0.000
5,508.50	0.000	0.000	0.000	0.000
5,509.00	0.000	0.000	0.297	0.297
5,509.50	0.000	0.000	0.420	0.420
5,509.84	0.000	0.000	0.486	0.486
5,510.00	0.000	0.000	0.515	0.515
5,510.50	0.000	0.000	0.594	0.594
5,511.00	0.000	0.000	0.664	0.664
5,511.08	0.000	0.000	0.675	0.675
5,511.50	0.000	0.000	0.728	0.728
5,512.00	0.000	0.000	0.786	0.786
5,512.50	0.000	0.000	0.840	0.840
5,513.00	0.000	0.000	0.891	0.891
5,513.50	0.000	0.000	0.940	0.940
5,513.76	0.000	0.000	0.964	0.964
5,513.77	0.000	0.000	0.965	0.965
5,513.78	0.000	0.000	0.965	0.965
5,514.00	0.000	0.000	0.985	0.985
5,514.50	0.000	0.000	1.029	1.029
5,515.00	0.000	0.000	1.071	1.071
5,515.50	0.000	0.000	1.112	1.112
5,516.00	0.000	0.000	1.151	1.151
5,516.50	0.000	0.000	1.188	1.188
5,517.00	0.000	0.000	1.225	1.225
5,517.50	0.000	2.674	1.261	3.935
5,518.00	0.000	3.782	1.295	5.077
5,518.50	0.000	4.632	1.329	5.960
5,519.00	0.000	5.348	1.362	6.710

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Elevation (ft)	Broad- crested Weir (cfs)	Drop Inlet (cfs)	Drop Inlet (cfs)	Combined Total Discharge (cfs)
5,519.50	10.914	5.979	1.394	18.287
5,520.00	30.870	6.550	1.425	38.845
5,520.10	35.614	6.658	1.431	43.704

## Structure #3 (Pond)

### *Basin I Pond*

#### Pond Inputs:

Initial Pool Elev:	5,772.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	0.00 %

*\*No sediment capacity defined*

### Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
5.00	5,789.00

#### Pond Results:

Peak Elevation:	5,774.72 ft
H'graph Detention Time:	0.00 hrs
Pond Model:	CSTRS
Dewater Time:	0.00 days
Trap Efficiency:	0.00 %

*Dewatering time is calculated from peak stage to lowest spillway*

### Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,772.00	0.240	0.000	0.000	Top of Sed. Storage
5,772.01	0.240	0.002	0.000	
5,772.50	0.259	0.125	0.000	
5,773.00	0.279	0.259	0.000	
5,773.50	0.300	0.404	0.000	
5,774.00	0.321	0.559	0.000	
5,774.50	0.333	0.723	0.000	
5,774.72	0.339	0.797	0.000	0.00 Peak Stage
5,775.00	0.345	0.892	0.000	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,775.50	0.358	1.068	0.000	
5,776.00	0.371	1.250	0.000	
5,776.50	0.385	1.439	0.000	
5,777.00	0.399	1.635	0.000	
5,777.50	0.414	1.839	0.000	
5,778.00	0.429	2.049	0.000	
5,778.50	0.443	2.268	0.000	
5,779.00	0.458	2.493	0.000	
5,779.50	0.472	2.725	0.000	
5,780.00	0.487	2.965	0.000	
5,780.50	0.501	3.212	0.000	
5,781.00	0.515	3.466	0.000	
5,781.50	0.529	3.727	0.000	
5,782.00	0.544	3.995	0.000	
5,782.50	0.558	4.271	0.000	
5,783.00	0.573	4.554	0.000	
5,783.50	0.587	4.843	0.000	
5,784.00	0.602	5.141	0.000	
5,784.50	0.617	5.445	0.000	
5,785.00	0.632	5.758	0.000	
5,785.50	0.647	6.077	0.000	
5,786.00	0.663	6.405	0.000	
5,786.50	0.679	6.740	0.000	
5,787.00	0.695	7.084	0.000	
5,787.50	0.711	7.435	0.000	
5,788.00	0.727	7.795	0.000	
5,788.50	0.746	8.163	0.000	
5,789.00	0.765	8.541	0.000	Spillway #1
5,789.50	0.784	8.928	5.457	
5,790.00	0.803	9.325	15.435	

Detailed Discharge Table

Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,772.00	0.000	0.000
5,772.01	0.000	0.000
5,772.50	0.000	0.000
5,773.00	0.000	0.000
5,773.50	0.000	0.000

Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,774.00	0.000	0.000
5,774.50	0.000	0.000
5,775.00	0.000	0.000
5,775.50	0.000	0.000
5,776.00	0.000	0.000
5,776.50	0.000	0.000
5,777.00	0.000	0.000
5,777.50	0.000	0.000
5,778.00	0.000	0.000
5,778.50	0.000	0.000
5,779.00	0.000	0.000
5,779.50	0.000	0.000
5,780.00	0.000	0.000
5,780.50	0.000	0.000
5,781.00	0.000	0.000
5,781.50	0.000	0.000
5,782.00	0.000	0.000
5,782.50	0.000	0.000
5,783.00	0.000	0.000
5,783.50	0.000	0.000
5,784.00	0.000	0.000
5,784.50	0.000	0.000
5,785.00	0.000	0.000
5,785.50	0.000	0.000
5,786.00	0.000	0.000
5,786.50	0.000	0.000
5,787.00	0.000	0.000
5,787.50	0.000	0.000
5,788.00	0.000	0.000
5,788.50	0.000	0.000
5,789.00	0.000	0.000
5,789.50	0.000	5.457
5,790.00	0.000	15.435

Structure #2 (Pond)*Upper Pond*

## Pond Inputs:

Initial Pool Elev:	6,278.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

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\*No sediment capacity defined

## Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
24.00	3500.00	30.00	0.0150	6,287.00	0.90	0.00

### Pond Results:

	Peak Elevation:	6,279.30 ft
H'graph	Detention Time:	0.00 hrs
	Pond Model:	CSTRS
	Dewater Time:	0.00 days
	Trap Efficiency:	0.00 %

*Dewatering time is calculated from peak stage to lowest spillway*

## Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
6,278.00	0.412	0.000	0.000	Top of Sed. Storage
6,278.01	0.420	0.004	0.000	
6,278.50	0.817	0.302	0.000	
6,279.00	1.355	0.839	0.000	
6,279.30	1.788	1.344	0.000	0.00 Peak Stage
6,279.50	2.030	1.680	0.000	
6,280.00	2.840	2.891	0.000	
6,280.50	3.214	4.404	0.000	
6,281.00	3.611	6.109	0.000	
6,281.50	4.031	8.019	0.000	
6,282.00	4.474	10.144	0.000	
6,282.50	4.768	12.454	0.000	
6,283.00	5.071	14.913	0.000	
6,283.50	5.384	17.527	0.000	
6,284.00	5.705	20.299	0.000	
6,284.50	5.975	23.218	0.000	
6,285.00	6.251	26.275	0.000	
6,285.50	6.534	29.471	0.000	
6,286.00	6.822	32.809	0.000	
6,286.50	7.023	36.270	0.000	
6,287.00	7.226	39.832	0.000	Spillway #1
6,287.50	7.432	43.497	1.486	
6,288.00	7.641	47.265	4.189	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
6,288.50	7.877	51.144	7.695	
6,289.00	8.117	55.143	11.847	
6,289.50	8.361	59.262	16.095	
6,290.00	8.608	63.505	19.498	

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
6,278.00	0.000	0.000
6,278.01	0.000	0.000
6,278.50	0.000	0.000
6,279.00	0.000	0.000
6,279.50	0.000	0.000
6,280.00	0.000	0.000
6,280.50	0.000	0.000
6,281.00	0.000	0.000
6,281.50	0.000	0.000
6,282.00	0.000	0.000
6,282.50	0.000	0.000
6,283.00	0.000	0.000
6,283.50	0.000	0.000
6,284.00	0.000	0.000
6,284.50	0.000	0.000
6,285.00	0.000	0.000
6,285.50	0.000	0.000
6,286.00	0.000	0.000
6,286.50	0.000	0.000
6,287.00	0.000	0.000
6,287.50	(3)>1.486	1.486
6,288.00	(3)>4.189	4.189
6,288.50	(3)>7.695	7.695
6,289.00	(3)>11.847	11.847
6,289.50	(4)>16.095	16.095
6,290.00	(5)>19.498	19.498

Structure #4 (Null)

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## **Subwatershed Hydrology Detail:**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	249.370	1.223	0.000	0.000	71.000	TR55	23.44	6.226
	$\Sigma$	<b>249.370</b>						<b>23.44</b>	<b>6.226</b>
#5	$\Sigma$	<b>249.370</b>						<b>11.76</b>	<b>3.858</b>
#3	1	231.310	1.190	0.000	0.000	57.000	TR55	1.00	0.795
	$\Sigma$	<b>231.310</b>						<b>1.00</b>	<b>0.795</b>
#2	1	35.085	0.370	0.000	0.000	76.000	TR55	12.10	1.341
	$\Sigma$	<b>35.085</b>						<b>12.10</b>	<b>1.341</b>
#4	1	248.850	1.223	0.000	0.000	78.000	TR55	53.07	11.003
	$\Sigma$	<b>764.615</b>						<b>53.07</b>	<b>14.845</b>

## **Subwatershed Sedimentology Detail:**

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Peak Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	100.00	36.40	0.9000	1.0000	1	2,172.3	355,997	126.41	81.98
	$\Sigma$							<b>2,172.3</b>	<b>355,997</b>	<b>126.41</b>	<b>81.98</b>
#5	$\Sigma$							<b>40.5</b>	<b>11,410</b>	<b>0.00</b>	<b>0.00</b>
#3	1	0.240	100.00	36.40	0.9000	1.0000	1	117.2	114,924	66.02	59.80
	$\Sigma$							<b>117.2</b>	<b>114,924</b>	<b>66.02</b>	<b>59.80</b>
#2	1	0.240	100.00	36.40	0.3000	1.0000	1	211.0	209,260	109.47	57.26
	$\Sigma$							<b>211.0</b>	<b>209,260</b>	<b>109.47</b>	<b>57.26</b>
#4	1	0.150	100.00	36.40	0.3500	1.0000	1	1,147.6	119,073	48.65	30.28
	$\Sigma$							<b>1,147.6</b>	<b>119,073</b>	<b>57.32</b>	<b>27.51</b>

## **Bingham Sedimentation Pond Scenario II**

***This Scenario looks at the 100-year, 24-hour storm contributing to the ponds tributary to the Bingham Canyon reclamation effort.***

***All proposed waste rock faces are vegetated for this scenario.  
All runoff west of the bench elevation 6390 travels to the pit.***

Lizel Spencer

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## ***General Information***

### ***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	2.980 inches

### ***Particle Size Distribution:***

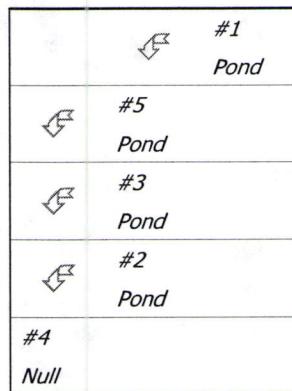
Size (mm)	Eroded Material
19.0000	100.000%
9.5000	97.700%
4.7500	90.600%
2.0000	81.900%
0.8500	71.700%
0.4250	63.600%
0.2500	57.500%
0.1500	51.500%
0.0750	42.900%
0.0638	39.480%
0.0460	36.300%
0.0331	33.110%
0.0214	29.290%
0.0125	27.380%
0.0089	25.470%
0.0063	24.200%
0.0045	21.010%
0.0031	17.830%
0.0022	15.280%
0.0012	13.370%

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## Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#5	0.000	0.000	Lower Pond Sediment
Pond	#2	==>	#4	0.000	0.000	Upper Pond
Pond	#3	==>	#4	0.000	0.000	Basin I Pond
Null	#4	==>	End	0.000	0.000	
Pond	#5	==>	#4	0.000	0.000	Lower Pond Detention



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## Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	249.370	249.370	11.27	4.41	288.6	69,863	22.57	15.25
	Out			6.40	2.97	18.9	6,671	0.00	0.00
#5	In	0.000	249.370	6.40	2.97	18.9	6,669	0.00	0.00
	Out			3.99	2.96	18.8	6,142	0.00	0.00
#3	In	248.850	248.850	13.52	4.93	2.4	543	0.17	0.12
	Out			0.00	0.00	2.4	0	0.00	0.00
#2	In	35.085	35.085	29.05	2.91	532.3	231,785	125.72	68.24
	Out			0.00	0.00	532.3	0	0.00	0.00
#4		0.000	533.305	3.99	2.96	553.5	6,140	4.74	4.40

***Particle Size Distribution(s) at Each Structure******Structure #1 (Lower Pond Sediment):***

Size (mm)	In	Out
19.0000	100.000%	100.000%
9.5000	100.000%	100.000%
4.7500	100.000%	100.000%
2.0000	100.000%	100.000%
0.8500	100.000%	100.000%
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	100.000%	100.000%
0.0750	95.696%	100.000%
0.0638	88.067%	100.000%
0.0460	80.973%	100.000%
0.0331	73.858%	100.000%
0.0214	65.336%	100.000%
0.0125	61.076%	100.000%
0.0089	56.815%	100.000%
0.0063	53.982%	100.000%
0.0045	46.866%	100.000%
0.0031	39.773%	100.000%
0.0022	34.085%	100.000%
0.0012	29.824%	100.000%

***Structure #5 (Lower Pond Detention):***

Size (mm)	In	Out
19.0000	100.000%	100.000%
9.5000	100.000%	100.000%
4.7500	100.000%	100.000%
2.0000	100.000%	100.000%
0.8500	100.000%	100.000%
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	100.000%	100.000%

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Size (mm)	In	Out
0.0750	100.000%	100.000%
0.0638	100.000%	100.000%
0.0460	100.000%	100.000%
0.0331	100.000%	100.000%
0.0214	100.000%	100.000%
0.0125	100.000%	100.000%
0.0089	100.000%	100.000%
0.0063	100.000%	100.000%
0.0045	100.000%	100.000%
0.0031	100.000%	100.000%
0.0022	100.000%	100.000%
0.0012	100.000%	100.000%

## ***Structure #3 (Basin I Pond):***

Size (mm)	In	Out
19.0000	100.000%	0.000%
9.5000	100.000%	0.000%
4.7500	100.000%	0.000%
2.0000	100.000%	0.000%
0.8500	100.000%	0.000%
0.4250	100.000%	0.000%
0.2500	100.000%	0.000%
0.1500	100.000%	0.000%
0.0750	96.112%	0.000%
0.0638	88.450%	0.000%
0.0460	81.325%	0.000%
0.0331	74.178%	0.000%
0.0214	65.620%	0.000%
0.0125	61.341%	0.000%
0.0089	57.062%	0.000%
0.0063	54.217%	0.000%
0.0045	47.070%	0.000%
0.0031	39.946%	0.000%
0.0022	34.233%	0.000%
0.0012	29.954%	0.000%

## ***Structure #2 (Upper Pond):***

Size (mm)	In	Out
19.0000	100.000%	0.000%
9.5000	100.000%	0.000%

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Size (mm)	In	Out
4.7500	100.000%	0.000%
2.0000	97.510%	0.000%
0.8500	85.366%	0.000%
0.4250	75.722%	0.000%
0.2500	68.459%	0.000%
0.1500	61.316%	0.000%
0.0750	51.077%	0.000%
0.0638	47.005%	0.000%
0.0460	43.219%	0.000%
0.0331	39.421%	0.000%
0.0214	34.873%	0.000%
0.0125	32.598%	0.000%
0.0089	30.324%	0.000%
0.0063	28.812%	0.000%
0.0045	25.014%	0.000%
0.0031	21.228%	0.000%
0.0022	18.192%	0.000%
0.0012	15.918%	0.000%

## ***Structure #4:***

Size (mm)	In/Out
19.0000	3.394%
9.5000	3.394%
4.7500	3.394%
2.0000	3.394%
0.8500	3.394%
0.4250	3.394%
0.2500	3.394%
0.1500	3.394%
0.0750	3.394%
0.0638	3.394%
0.0460	3.394%
0.0331	3.394%
0.0214	3.394%
0.0125	3.394%
0.0089	3.394%
0.0063	3.394%
0.0045	3.394%
0.0031	3.394%
0.0022	3.394%
0.0012	3.394%

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## Structure Detail:

### Structure #1 (Pond)

#### *Lower Pond Sediment*

##### Pond Inputs:

Initial Pool Elev:	5,508.45 ft
Initial Pool:	0.01 ac-ft
*Sediment Storage:	0.04 ac-ft
Dead Space:	20.00 %

*\*Sediment capacity based on Average Annual R of 10.0 for 1 year(s)*

#### Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
50.00	5,514.00

##### Pond Results:

Peak Elevation:	5,514.06 ft
H'graph Detention Time:	1.80 hrs
Pond Model:	CSTRS
Dewater Time:	0.48 days
Trap Efficiency:	93.46 %

*Dewatering time is calculated from peak stage to lowest spillway*

#### Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,508.36	0.111	0.000	0.000	Top of Sed. Storage
5,508.45	0.115	0.010	0.000	
5,508.50	0.118	0.016	0.000	
5,509.00	0.143	0.081	0.000	
5,509.05	0.146	0.089	0.000	
5,509.50	0.172	0.160	0.000	
5,509.90	0.196	0.233	0.000	
5,510.00	0.202	0.253	0.000	
5,510.50	0.224	0.360	0.000	
5,511.00	0.248	0.478	0.000	
5,511.50	0.273	0.608	0.000	
5,512.00	0.299	0.751	0.000	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,512.50	0.323	0.906	0.000	
5,513.00	0.348	1.074	0.000	
5,513.50	0.374	1.254	0.000	
5,513.90	0.395	1.408	0.000	
5,514.00	0.400	1.448	0.000	Spillway #1
5,514.06	0.402	1.472	6.404	11.45 Peak Stage
5,514.50	0.423	1.654	54.571	
5,515.00	0.446	1.871	154.350	
5,515.50	0.469	2.100	283.559	
5,516.00	0.493	2.340	436.568	
5,516.50	0.520	2.593	610.122	
5,516.90	0.541	2.805	762.222	
5,517.00	0.547	2.860	802.026	
5,517.50	0.574	3.140	1,010.668	
5,517.90	0.597	3.374	1,188.741	
5,518.00	0.602	3.434	1,234.800	

Detailed Discharge Table

Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,508.36	0.000	0.000
5,508.45	0.000	0.000
5,508.50	0.000	0.000
5,509.00	0.000	0.000
5,509.05	0.000	0.000
5,509.50	0.000	0.000
5,509.90	0.000	0.000
5,510.00	0.000	0.000
5,510.50	0.000	0.000
5,511.00	0.000	0.000
5,511.50	0.000	0.000
5,512.00	0.000	0.000
5,512.50	0.000	0.000
5,513.00	0.000	0.000
5,513.50	0.000	0.000
5,513.90	0.000	0.000
5,514.00	0.000	0.000
5,514.50	54.571	54.571

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Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,515.00	154.350	154.350
5,515.50	283.559	283.559
5,516.00	436.568	436.568
5,516.50	610.122	610.122
5,516.90	762.222	762.222
5,517.00	802.026	802.026
5,517.50	1,010.668	1,010.668
5,517.90	1,188.741	1,188.741
5,518.00	1,234.800	1,234.800

## Structure #5 (Pond)

### *Lower Pond Detention*

#### Pond Inputs:

Initial Pool Elev:	5,508.25 ft
Initial Pool:	0.01 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

\*Sediment capacity based on Average Annual R of 10.0 for 1 year(s)

### Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
12.00	7.00	12.00	350.00	4.70	0.0150	5,517.00

### Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,519.00

### Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
4.00	0.50	4.00	2.00	4.70	0.0150	5,508.50

#### Pond Results:

Peak Elevation:	5,517.53 ft
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H'graph Detention Time:	3.26 hrs
Pond Model:	CSTRS
Dewater Time:	0.89 days
Trap Efficiency:	0.45 %

*Dewatering time is calculated from peak stage to lowest spillway*

## Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,508.07	0.037	0.000	0.000	Top of Sed. Storage
5,508.23	0.039	0.006	0.000	
5,508.25	0.039	0.007	0.000	
5,508.50	0.042	0.017	0.000	Spillway #3
5,509.00	0.048	0.039	0.297	3.75
5,509.50	0.055	0.065	0.420	0.85
5,510.00	0.062	0.094	0.515	0.75
5,510.50	0.065	0.126	0.594	0.70
5,511.00	0.068	0.159	0.664	0.65
5,511.50	0.071	0.194	0.728	0.60
5,512.00	0.074	0.230	0.786	0.60
5,512.50	0.077	0.268	0.840	0.55
5,513.00	0.080	0.307	0.891	0.55
5,513.50	0.083	0.348	0.940	0.55
5,514.00	0.086	0.390	0.985	0.50
5,514.50	0.088	0.434	1.029	0.55
5,515.00	0.090	0.479	1.071	0.50
5,515.50	0.093	0.524	1.112	0.50
5,516.00	0.095	0.571	1.151	0.50
5,516.50	0.098	0.619	1.188	0.50
5,517.00	0.101	0.669	1.225	0.65 Spillway #1
5,517.50	0.104	0.720	3.935	7.70
5,517.53	0.104	0.723	3.994	0.50 Peak Stage
5,518.00	0.107	0.773	5.077	
5,518.10	0.756	0.811	5.268	
5,518.50	0.786	1.120	5.960	
5,519.00	0.824	1.522	6.710	Spillway #2
5,519.50	0.863	1.944	18.287	
5,520.00	0.902	2.385	38.845	

## Detailed Discharge Table

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Elevation (ft)	Drop Inlet (cfs)	Broad- crested Weir (cfs)	Drop Inlet (cfs)	Combined Total Discharge (cfs)
5,508.07	0.000	0.000	0.000	0.000
5,508.23	0.000	0.000	0.000	0.000
5,508.25	0.000	0.000	0.000	0.000
5,508.50	0.000	0.000	0.000	0.000
5,509.00	0.000	0.000	0.297	0.297
5,509.50	0.000	0.000	0.420	0.420
5,510.00	0.000	0.000	0.515	0.515
5,510.50	0.000	0.000	0.594	0.594
5,511.00	0.000	0.000	0.664	0.664
5,511.50	0.000	0.000	0.728	0.728
5,512.00	0.000	0.000	0.786	0.786
5,512.50	0.000	0.000	0.840	0.840
5,513.00	0.000	0.000	0.891	0.891
5,513.50	0.000	0.000	0.940	0.940
5,514.00	0.000	0.000	0.985	0.985
5,514.50	0.000	0.000	1.029	1.029
5,515.00	0.000	0.000	1.071	1.071
5,515.50	0.000	0.000	1.112	1.112
5,516.00	0.000	0.000	1.151	1.151
5,516.50	0.000	0.000	1.188	1.188
5,517.00	0.000	0.000	1.225	1.225
5,517.50	2.674	0.000	1.261	3.935
5,518.00	3.782	0.000	1.295	5.077
5,518.10	3.966	0.000	1.302	5.268
5,518.50	4.632	0.000	1.329	5.960
5,519.00	5.348	0.000	1.362	6.710
5,519.50	5.979	10.914	1.394	18.287
5,520.00	6.550	30.870	1.425	38.845

## Structure #3 (Pond)

### *Basin I Pond*

#### Pond Inputs:

Initial Pool Elev:	5,772.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	0.00 %

*\*No sediment capacity defined*

### Broad-crested Weir

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Weir Width (ft)	Spillway Elev (ft)
5.00	5,789.00

## Pond Results:

Peak Elevation:	5,783.65 ft
H'graph Detention Time:	0.00 hrs
Pond Model:	CSTRS
Dewater Time:	0.00 days
Trap Efficiency:	0.00 %

*Dewatering time is calculated from peak stage to lowest spillway*

## Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,772.00	0.240	0.000	0.000	Top of Sed. Storage
5,772.01	0.240	0.002	0.000	
5,772.50	0.259	0.125	0.000	
5,773.00	0.279	0.259	0.000	
5,773.50	0.300	0.404	0.000	
5,774.00	0.321	0.559	0.000	
5,774.50	0.333	0.723	0.000	
5,775.00	0.345	0.892	0.000	
5,775.50	0.358	1.068	0.000	
5,776.00	0.371	1.250	0.000	
5,776.50	0.385	1.439	0.000	
5,777.00	0.399	1.635	0.000	
5,777.50	0.414	1.839	0.000	
5,778.00	0.429	2.049	0.000	
5,778.50	0.443	2.268	0.000	
5,779.00	0.458	2.493	0.000	
5,779.50	0.472	2.725	0.000	
5,780.00	0.487	2.965	0.000	
5,780.50	0.501	3.212	0.000	
5,781.00	0.515	3.466	0.000	
5,781.50	0.529	3.727	0.000	
5,782.00	0.544	3.995	0.000	
5,782.50	0.558	4.271	0.000	
5,783.00	0.573	4.554	0.000	
5,783.50	0.587	4.843	0.000	
5,783.65	0.592	4.931	0.000	0.00 Peak Stage

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,784.00	0.602	5.141	0.000	
5,784.50	0.617	5.445	0.000	
5,785.00	0.632	5.758	0.000	
5,785.50	0.647	6.077	0.000	
5,786.00	0.663	6.405	0.000	
5,786.50	0.679	6.740	0.000	
5,787.00	0.695	7.084	0.000	
5,787.50	0.711	7.435	0.000	
5,788.00	0.727	7.795	0.000	
5,788.50	0.746	8.163	0.000	
5,789.00	0.765	8.541	0.000	Spillway #1
5,789.50	0.784	8.928	5.457	
5,790.00	0.803	9.325	15.435	

Detailed Discharge Table

Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,772.00	0.000	0.000
5,772.01	0.000	0.000
5,772.50	0.000	0.000
5,773.00	0.000	0.000
5,773.50	0.000	0.000
5,774.00	0.000	0.000
5,774.50	0.000	0.000
5,775.00	0.000	0.000
5,775.50	0.000	0.000
5,776.00	0.000	0.000
5,776.50	0.000	0.000
5,777.00	0.000	0.000
5,777.50	0.000	0.000
5,778.00	0.000	0.000
5,778.50	0.000	0.000
5,779.00	0.000	0.000
5,779.50	0.000	0.000
5,780.00	0.000	0.000
5,780.50	0.000	0.000
5,781.00	0.000	0.000
5,781.50	0.000	0.000

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Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,782.00	0.000	0.000
5,782.50	0.000	0.000
5,783.00	0.000	0.000
5,783.50	0.000	0.000
5,784.00	0.000	0.000
5,784.50	0.000	0.000
5,785.00	0.000	0.000
5,785.50	0.000	0.000
5,786.00	0.000	0.000
5,786.50	0.000	0.000
5,787.00	0.000	0.000
5,787.50	0.000	0.000
5,788.00	0.000	0.000
5,788.50	0.000	0.000
5,789.00	0.000	0.000
5,789.50	5.457	5.457
5,790.00	15.435	15.435

## Structure #2 (Pond)

### *Upper Pond*

#### Pond Inputs:

Initial Pool Elev:	6,278.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

*\*No sediment capacity defined*

### Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
24.00	3000.00	30.00	0.0150	6,287.00	0.90	0.00

#### Pond Results:

Peak Elevation:	6,280.01 ft
H'graph Detention Time:	0.00 hrs
Pond Model:	CSTRS
Dewater Time:	0.00 days

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Trap Efficiency: 0.00 %

Dewatering time is calculated from peak stage to lowest spillway

## Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
6,278.00	0.412	0.000	0.000	Top of Sed. Storage
6,278.01	0.420	0.004	0.000	
6,278.50	0.817	0.302	0.000	
6,279.00	1.355	0.839	0.000	
6,279.50	2.030	1.680	0.000	
6,280.00	2.840	2.891	0.000	
6,280.01	2.632	2.917	0.000	0.00 Peak Stage
6,280.50	3.214	4.404	0.000	
6,281.00	3.611	6.109	0.000	
6,281.50	4.031	8.019	0.000	
6,282.00	4.474	10.144	0.000	
6,282.50	4.768	12.454	0.000	
6,283.00	5.071	14.913	0.000	
6,283.50	5.384	17.527	0.000	
6,284.00	5.705	20.299	0.000	
6,284.50	5.975	23.218	0.000	
6,285.00	6.251	26.275	0.000	
6,285.50	6.534	29.471	0.000	
6,286.00	6.822	32.809	0.000	
6,286.50	7.023	36.270	0.000	
6,287.00	7.226	39.832	0.000	Spillway #1
6,287.50	7.432	43.497	1.486	
6,288.00	7.641	47.265	4.189	
6,288.50	7.877	51.144	7.695	
6,289.00	8.117	55.143	11.847	
6,289.50	8.361	59.262	16.095	
6,290.00	8.608	63.505	19.498	

## Detailed Discharge Table

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Elevation (ft)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
6,278.00	0.000	0.000
6,278.01	0.000	0.000
6,278.50	0.000	0.000
6,279.00	0.000	0.000
6,279.50	0.000	0.000
6,280.00	0.000	0.000
6,280.50	0.000	0.000
6,281.00	0.000	0.000
6,281.50	0.000	0.000
6,282.00	0.000	0.000
6,282.50	0.000	0.000
6,283.00	0.000	0.000
6,283.50	0.000	0.000
6,284.00	0.000	0.000
6,284.50	0.000	0.000
6,285.00	0.000	0.000
6,285.50	0.000	0.000
6,286.00	0.000	0.000
6,286.50	0.000	0.000
6,287.00	0.000	0.000
6,287.50	(3)>1.486	1.486
6,288.00	(3)>4.189	4.189
6,288.50	(3)>7.695	7.695
6,289.00	(3)>11.847	11.847
6,289.50	(4)>16.095	16.095
6,290.00	(5)>19.498	19.498

Structure #4 (Null)

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## ***Subwatershed Hydrology Detail:***

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	249.370	1.223	0.000	0.000	56.000	TR55	11.27	4.407
	$\Sigma$	<b>249.370</b>						<b>11.27</b>	<b>4.407</b>
<b>#5</b>	$\Sigma$	<b>249.370</b>						<b>6.40</b>	<b>2.969</b>
#3	1	248.850	1.223	0.000	0.000	57.000	TR55	13.52	4.931
	$\Sigma$	<b>248.850</b>						<b>13.52</b>	<b>4.931</b>
#2	1	35.085	0.370	0.000	0.000	76.000	TR55	29.05	2.915
	$\Sigma$	<b>35.085</b>						<b>29.05</b>	<b>2.915</b>
<b>#4</b>	$\Sigma$	<b>533.305</b>						<b>3.99</b>	<b>2.959</b>

## ***Subwatershed Sedimentology Detail:***

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Peak Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.150	100.00	36.40	0.3500	1.0000	1	288.6	69,863	22.57	15.25
	$\Sigma$							<b>288.6</b>	<b>69,863</b>	<b>22.57</b>	<b>15.25</b>
<b>#5</b>	$\Sigma$							<b>18.9</b>	<b>6,669</b>	<b>0.00</b>	<b>0.00</b>
#3	1	0.150	100.00	30.00	0.0030	1.0000	1	2.4	543	0.17	0.12
	$\Sigma$							<b>2.4</b>	<b>543</b>	<b>0.17</b>	<b>0.12</b>
#2	1	0.240	100.00	36.40	0.3000	1.0000	1	532.3	231,785	125.72	68.24
	$\Sigma$							<b>532.3</b>	<b>231,785</b>	<b>125.72</b>	<b>68.24</b>
<b>#4</b>	$\Sigma$							<b>553.5</b>	<b>6,140</b>	<b>4.74</b>	<b>4.40</b>

## **Bingham Sedimentation Pond Scenario III**

***This Scenario looks at the 100-year, 24-hour storm contributing to the ponds tributary to the Bingham Canyon reclamation effort.***

***All proposed and existing waste rock faces below elevation 6390 shall be vegetated for this scenario. The waste rock face above elevation 6390 remains unvegetated. All runoff above elevation 6390 travels to the upper pond.***

Lizel Spencer

## ***General Information***

### ***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	100 yr - 24 hr
Rainfall Depth:	2.980 inches

### ***Particle Size Distribution:***

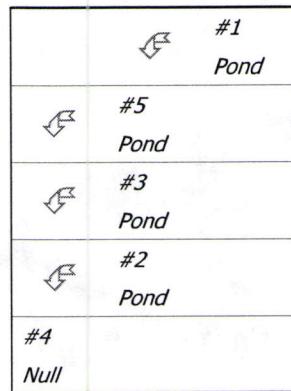
Size (mm)	Eroded Material
19.0000	100.000%
9.5000	97.700%
4.7500	90.600%
2.0000	81.900%
0.8500	71.700%
0.4250	63.600%
0.2500	57.500%
0.1500	51.500%
0.0750	42.900%
0.0638	39.480%
0.0460	36.300%
0.0331	33.110%
0.0214	29.290%
0.0125	27.380%
0.0089	25.470%
0.0063	24.200%
0.0045	21.010%
0.0031	17.830%
0.0022	15.280%
0.0012	13.370%

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## Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#5	0.000	0.000	Lower Pond Sediment
Pond	#2	==>	#4	0.000	0.000	Upper Pond
Pond	#3	==>	#4	0.000	0.000	Basin I Pond
Null	#4	==>	End	0.000	0.000	
Pond	#5	==>	#4	0.000	0.000	Lower Pond Detention



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## Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	249.370	249.370	11.27	4.41	288.6	69,863	22.57	15.25
	Out			6.40	2.97	18.9	6,672	0.00	0.00
#5	In	0.000	249.370	6.40	2.97	18.9	6,670	0.00	0.00
	Out			3.99	2.96	18.8	6,142	0.00	0.00
#3	In	248.850	248.850	13.52	4.93	2.4	543	0.17	0.12
	Out			0.00	0.00	2.4	0	0.00	0.00
#2	In	438.460	438.460	202.93	44.77	21,938.0	460,667	187.54	126.42
	Out			6.49	16.58	150.9	20,656	0.00	0.00
#4		0.000	936.680	9.59	19.54	172.1	18,985	0.21	0.10

***Particle Size Distribution(s) at Each Structure******Structure #1 (Lower Pond Sediment):***

Size (mm)	In	Out
19.0000	100.000%	100.000%
9.5000	100.000%	100.000%
4.7500	100.000%	100.000%
2.0000	100.000%	100.000%
0.8500	100.000%	100.000%
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	100.000%	100.000%
0.0750	95.696%	100.000%
0.0638	88.067%	100.000%
0.0460	80.973%	100.000%
0.0331	73.858%	100.000%
0.0214	65.336%	100.000%
0.0125	61.076%	100.000%
0.0089	56.815%	100.000%
0.0063	53.982%	100.000%
0.0045	46.866%	100.000%
0.0031	39.773%	100.000%
0.0022	34.085%	100.000%
0.0012	29.824%	100.000%

***Structure #5 (Lower Pond Detention):***

Size (mm)	In	Out
19.0000	100.000%	100.000%
9.5000	100.000%	100.000%
4.7500	100.000%	100.000%
2.0000	100.000%	100.000%
0.8500	100.000%	100.000%
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	100.000%	100.000%

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Size (mm)	In	Out
0.0750	100.000%	100.000%
0.0638	100.000%	100.000%
0.0460	100.000%	100.000%
0.0331	100.000%	100.000%
0.0214	100.000%	100.000%
0.0125	100.000%	100.000%
0.0089	100.000%	100.000%
0.0063	100.000%	100.000%
0.0045	100.000%	100.000%
0.0031	100.000%	100.000%
0.0022	100.000%	100.000%
0.0012	100.000%	100.000%

## ***Structure #3 (Basin I Pond):***

Size (mm)	In	Out
19.0000	100.000%	0.000%
9.5000	100.000%	0.000%
4.7500	100.000%	0.000%
2.0000	100.000%	0.000%
0.8500	100.000%	0.000%
0.4250	100.000%	0.000%
0.2500	100.000%	0.000%
0.1500	100.000%	0.000%
0.0750	96.112%	0.000%
0.0638	88.450%	0.000%
0.0460	81.325%	0.000%
0.0331	74.178%	0.000%
0.0214	65.620%	0.000%
0.0125	61.341%	0.000%
0.0089	57.062%	0.000%
0.0063	54.217%	0.000%
0.0045	47.070%	0.000%
0.0031	39.946%	0.000%
0.0022	34.233%	0.000%
0.0012	29.954%	0.000%

## ***Structure #2 (Upper Pond):***

Size (mm)	In	Out
19.0000	100.000%	100.000%
9.5000	100.000%	100.000%

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Size (mm)	In	Out
4.7500	100.000%	100.000%
2.0000	100.000%	100.000%
0.8500	100.000%	100.000%
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	93.931%	100.000%
0.0750	78.245%	100.000%
0.0638	72.008%	100.000%
0.0460	66.208%	100.000%
0.0331	60.389%	100.000%
0.0214	53.422%	100.000%
0.0125	49.938%	100.000%
0.0089	46.455%	100.000%
0.0063	44.138%	100.000%
0.0045	38.320%	100.000%
0.0031	32.520%	100.000%
0.0022	27.869%	100.000%
0.0012	24.386%	100.000%

## ***Structure #4:***

Size (mm)	In/Out
19.0000	98.604%
9.5000	98.604%
4.7500	98.604%
2.0000	98.604%
0.8500	98.604%
0.4250	98.604%
0.2500	98.604%
0.1500	98.604%
0.0750	98.604%
0.0638	98.604%
0.0460	98.604%
0.0331	98.604%
0.0214	98.604%
0.0125	98.604%
0.0089	98.604%
0.0063	98.604%
0.0045	98.604%
0.0031	98.604%
0.0022	98.604%
0.0012	98.604%

***Structure Detail:****Structure #1 (Pond)**Lower Pond Sediment***Pond Inputs:**

Initial Pool Elev:	5,508.45 ft
Initial Pool:	0.01 ac-ft
*Sediment Storage:	0.04 ac-ft
Dead Space:	20.00 %

*\*Sediment capacity based on Average Annual R of 10.0 for 1 year(s)***Broad-crested Weir**

Weir Width (ft)	Spillway Elev (ft)
50.00	5,514.00

**Pond Results:**

Peak Elevation:	5,514.06 ft
H'graph Detention Time:	1.80 hrs
Pond Model:	CSTRS
Dewater Time:	0.48 days
Trap Efficiency:	93.46 %

*Dewatering time is calculated from peak stage to lowest spillway***Elevation-Capacity-Discharge Table**

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,508.36	0.111	0.000	0.000	Top of Sed. Storage
5,508.45	0.115	0.010	0.000	
5,508.50	0.118	0.016	0.000	
5,509.00	0.143	0.081	0.000	
5,509.05	0.146	0.089	0.000	
5,509.50	0.172	0.160	0.000	
5,509.90	0.196	0.233	0.000	
5,510.00	0.202	0.253	0.000	
5,510.50	0.224	0.360	0.000	
5,511.00	0.248	0.478	0.000	
5,511.50	0.273	0.608	0.000	
5,512.00	0.299	0.751	0.000	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,512.50	0.323	0.906	0.000	
5,513.00	0.348	1.074	0.000	
5,513.50	0.374	1.254	0.000	
5,514.00	0.400	1.448	0.000	Spillway #1
5,514.06	0.401	1.472	6.404	11.45 Peak Stage
5,514.50	0.423	1.654	54.571	
5,515.00	0.446	1.871	154.350	
5,515.50	0.469	2.099	283.559	
5,516.00	0.493	2.340	436.568	
5,516.50	0.520	2.593	610.122	
5,516.90	0.541	2.805	762.222	
5,517.00	0.547	2.860	802.026	
5,517.50	0.574	3.140	1,010.668	
5,517.90	0.597	3.374	1,188.741	
5,518.00	0.602	3.434	1,234.800	

Detailed Discharge Table

Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,508.36	0.000	0.000
5,508.45	0.000	0.000
5,508.50	0.000	0.000
5,509.00	0.000	0.000
5,509.05	0.000	0.000
5,509.50	0.000	0.000
5,509.90	0.000	0.000
5,510.00	0.000	0.000
5,510.50	0.000	0.000
5,511.00	0.000	0.000
5,511.50	0.000	0.000
5,512.00	0.000	0.000
5,512.50	0.000	0.000
5,513.00	0.000	0.000
5,513.50	0.000	0.000
5,514.00	0.000	0.000
5,514.50	54.571	54.571
5,515.00	154.350	154.350
5,515.50	283.559	283.559

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Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,516.00	436.568	436.568
5,516.50	610.122	610.122
5,516.90	762.222	762.222
5,517.00	802.026	802.026
5,517.50	1,010.668	1,010.668
5,517.90	1,188.741	1,188.741
5,518.00	1,234.800	1,234.800

## Structure #5 (Pond)

### *Lower Pond Detention*

#### Pond Inputs:

Initial Pool Elev:	5,508.25 ft
Initial Pool:	0.01 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

\*Sediment capacity based on Average Annual R of 10.0 for 1 year(s)

### Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
12.00	7.00	12.00	350.00	4.70	0.0150	5,517.00

### Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
10.00	5,519.00

### Drop Inlet

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)
4.00	0.50	4.00	2.00	4.70	0.0150	5,508.50

#### Pond Results:

Peak Elevation:	5,517.53 ft
H'graph Detention Time:	3.26 hrs
Pond Model:	CSTRS

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Dewater Time:	0.89 days
Trap Efficiency:	0.45 %

*Dewatering time is calculated from peak stage to lowest spillway*

## Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,508.07	0.037	0.000	0.000	Top of Sed. Storage
5,508.23	0.039	0.006	0.000	
5,508.25	0.039	0.007	0.000	
5,508.50	0.042	0.017	0.000	Spillway #3
5,509.00	0.048	0.039	0.297	3.75
5,509.50	0.055	0.065	0.420	0.85
5,510.00	0.062	0.094	0.515	0.75
5,510.50	0.065	0.126	0.594	0.70
5,511.00	0.068	0.159	0.664	0.65
5,511.50	0.071	0.194	0.728	0.60
5,512.00	0.074	0.230	0.786	0.60
5,512.50	0.077	0.268	0.840	0.55
5,513.00	0.080	0.307	0.891	0.55
5,513.50	0.083	0.348	0.940	0.55
5,514.00	0.086	0.390	0.985	0.50
5,514.50	0.088	0.434	1.029	0.55
5,515.00	0.090	0.479	1.071	0.50
5,515.50	0.093	0.524	1.112	0.50
5,516.00	0.095	0.571	1.151	0.50
5,516.50	0.098	0.619	1.188	0.50
5,517.00	0.101	0.669	1.225	0.65 Spillway #1
5,517.50	0.104	0.720	3.935	7.70
5,517.53	0.104	0.723	3.994	0.50 Peak Stage
5,518.00	0.107	0.773	5.077	
5,518.10	0.756	0.811	5.268	
5,518.50	0.786	1.120	5.960	
5,519.00	0.824	1.522	6.710	Spillway #2
5,519.50	0.863	1.944	18.287	
5,520.00	0.902	2.385	38.845	

## Detailed Discharge Table

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Elevation (ft)	Drop Inlet (cfs)	Broad- crested Weir (cfs)	Drop Inlet (cfs)	Combined Total Discharge (cfs)
5,508.07	0.000	0.000	0.000	0.000
5,508.23	0.000	0.000	0.000	0.000
5,508.25	0.000	0.000	0.000	0.000
5,508.50	0.000	0.000	0.000	0.000
5,509.00	0.000	0.000	0.297	0.297
5,509.50	0.000	0.000	0.420	0.420
5,510.00	0.000	0.000	0.515	0.515
5,510.50	0.000	0.000	0.594	0.594
5,511.00	0.000	0.000	0.664	0.664
5,511.50	0.000	0.000	0.728	0.728
5,512.00	0.000	0.000	0.786	0.786
5,512.50	0.000	0.000	0.840	0.840
5,513.00	0.000	0.000	0.891	0.891
5,513.50	0.000	0.000	0.940	0.940
5,514.00	0.000	0.000	0.985	0.985
5,514.50	0.000	0.000	1.029	1.029
5,515.00	0.000	0.000	1.071	1.071
5,515.50	0.000	0.000	1.112	1.112
5,516.00	0.000	0.000	1.151	1.151
5,516.50	0.000	0.000	1.188	1.188
5,517.00	0.000	0.000	1.225	1.225
5,517.50	2.674	0.000	1.261	3.935
5,518.00	3.782	0.000	1.295	5.077
5,518.10	3.966	0.000	1.302	5.268
5,518.50	4.632	0.000	1.329	5.960
5,519.00	5.348	0.000	1.362	6.710
5,519.50	5.979	10.914	1.394	18.287
5,520.00	6.550	30.870	1.425	38.845

### Structure #3 (Pond)

#### *Basin I Pond*

##### Pond Inputs:

Initial Pool Elev:	5,772.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	0.00 %

*\*No sediment capacity defined*

#### Broad-crested Weir

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Weir Width (ft)	Spillway Elev (ft)
5.00	5,789.00

## Pond Results:

Peak Elevation:	5,783.65 ft
H'graph Detention Time:	0.00 hrs
Pond Model:	CSTRS
Dewater Time:	0.00 days
Trap Efficiency:	0.00 %

*Dewatering time is calculated from peak stage to lowest spillway*

## Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,772.00	0.240	0.000	0.000	Top of Sed. Storage
5,772.01	0.240	0.002	0.000	
5,772.50	0.259	0.125	0.000	
5,773.00	0.279	0.259	0.000	
5,773.50	0.300	0.404	0.000	
5,774.00	0.321	0.559	0.000	
5,774.50	0.333	0.723	0.000	
5,775.00	0.345	0.892	0.000	
5,775.50	0.358	1.068	0.000	
5,776.00	0.371	1.250	0.000	
5,776.50	0.385	1.439	0.000	
5,777.00	0.399	1.635	0.000	
5,777.50	0.414	1.839	0.000	
5,778.00	0.429	2.049	0.000	
5,778.50	0.443	2.268	0.000	
5,779.00	0.458	2.493	0.000	
5,779.50	0.472	2.725	0.000	
5,780.00	0.487	2.965	0.000	
5,780.50	0.501	3.212	0.000	
5,781.00	0.515	3.466	0.000	
5,781.50	0.529	3.727	0.000	
5,782.00	0.544	3.995	0.000	
5,782.50	0.558	4.271	0.000	
5,783.00	0.573	4.554	0.000	
5,783.50	0.587	4.843	0.000	
5,783.65	0.592	4.931	0.000	0.00 Peak Stage

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,784.00	0.602	5.141	0.000	
5,784.50	0.617	5.445	0.000	
5,785.00	0.632	5.758	0.000	
5,785.50	0.647	6.077	0.000	
5,786.00	0.663	6.405	0.000	
5,786.50	0.679	6.740	0.000	
5,787.00	0.695	7.084	0.000	
5,787.50	0.711	7.435	0.000	
5,788.00	0.727	7.795	0.000	
5,788.50	0.746	8.163	0.000	
5,789.00	0.765	8.541	0.000	Spillway #1
5,789.50	0.784	8.928	5.457	
5,790.00	0.803	9.325	15.435	

Detailed Discharge Table

Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,772.00	0.000	0.000
5,772.01	0.000	0.000
5,772.50	0.000	0.000
5,773.00	0.000	0.000
5,773.50	0.000	0.000
5,774.00	0.000	0.000
5,774.50	0.000	0.000
5,775.00	0.000	0.000
5,775.50	0.000	0.000
5,776.00	0.000	0.000
5,776.50	0.000	0.000
5,777.00	0.000	0.000
5,777.50	0.000	0.000
5,778.00	0.000	0.000
5,778.50	0.000	0.000
5,779.00	0.000	0.000
5,779.50	0.000	0.000
5,780.00	0.000	0.000
5,780.50	0.000	0.000
5,781.00	0.000	0.000
5,781.50	0.000	0.000

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Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
5,782.00	0.000	0.000
5,782.50	0.000	0.000
5,783.00	0.000	0.000
5,783.50	0.000	0.000
5,784.00	0.000	0.000
5,784.50	0.000	0.000
5,785.00	0.000	0.000
5,785.50	0.000	0.000
5,786.00	0.000	0.000
5,786.50	0.000	0.000
5,787.00	0.000	0.000
5,787.50	0.000	0.000
5,788.00	0.000	0.000
5,788.50	0.000	0.000
5,789.00	0.000	0.000
5,789.50	5.457	5.457
5,790.00	15.435	15.435

## Structure #2 (Pond)

### *Upper Pond*

#### Pond Inputs:

Initial Pool Elev:	6,280.47 ft
Initial Pool:	4.31 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

*\*No sediment capacity defined*

### Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	3000.00	30.00	0.0150	6,284.00	0.90	0.00

#### Pond Results:

Peak Elevation:	6,287.48 ft
H'graph Detention Time:	16.01 hrs
Pond Model:	CSTRS
Dewater Time:	4.54 days

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Trap Efficiency: 99.31 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
6,278.00	0.412	0.000	0.000	Top of Sed. Storage
6,278.01	0.420	0.004	0.000	
6,278.50	0.817	0.302	0.000	
6,279.00	1.355	0.839	0.000	
6,279.50	2.030	1.680	0.000	
6,280.00	2.840	2.891	0.000	
6,280.47	3.192	4.309	0.000	
6,280.50	3.215	4.404	0.000	
6,281.00	3.613	6.110	0.000	
6,281.50	4.032	8.020	0.000	
6,282.00	4.474	10.146	0.000	
6,282.50	4.768	12.456	0.000	
6,283.00	5.071	14.916	0.000	
6,283.50	5.384	17.529	0.000	
6,284.00	5.705	20.301	0.000	Spillway #1
6,284.50	5.975	23.221	0.751	47.05*
6,285.00	6.251	26.277	2.094	17.66*
6,285.50	6.534	29.473	3.443	11.23*
6,286.00	6.822	32.812	4.414	9.15*
6,286.50	7.023	36.273	5.190	8.75
6,287.00	7.226	39.835	5.883	7.75
6,287.48	7.425	43.382	6.489	7.40 Peak Stage
6,287.50	7.432	43.499	6.509	
6,288.00	7.641	47.267	7.060	
6,288.50	7.877	51.146	7.597	
6,289.00	8.117	55.145	8.069	
6,289.50	8.361	59.265	8.540	
6,290.00	8.608	63.507	8.966	

\*Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.

Detailed Discharge Table

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Elevation (ft)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
6,278.00	0.000	0.000
6,278.01	0.000	0.000
6,278.50	0.000	0.000
6,279.00	0.000	0.000
6,279.50	0.000	0.000
6,280.00	0.000	0.000
6,280.47	0.000	0.000
6,280.50	0.000	0.000
6,281.00	0.000	0.000
6,281.50	0.000	0.000
6,282.00	0.000	0.000
6,282.50	0.000	0.000
6,283.00	0.000	0.000
6,283.50	0.000	0.000
6,284.00	0.000	0.000
6,284.50	(3)>0.751	0.751
6,285.00	(3)>2.094	2.094
6,285.50	(5)>3.443	3.443
6,286.00	(5)>4.414	4.414
6,286.50	(5)>5.190	5.190
6,287.00	(5)>5.883	5.883
6,287.50	(5)>6.509	6.509
6,288.00	(5)>7.060	7.060
6,288.50	(5)>7.597	7.597
6,289.00	(5)>8.069	8.069
6,289.50	(5)>8.540	8.540
6,290.00	(5)>8.966	8.966

Structure #4 (Null)

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## ***Subwatershed Hydrology Detail:***

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	249.370	1.223	0.000	0.000	56.000	TR55	11.27	4.407
	$\Sigma$	<b>249.370</b>						<b>11.27</b>	<b>4.407</b>
<b>#5</b>	$\Sigma$	<b>249.370</b>						<b>6.40</b>	<b>2.969</b>
#3	1	248.850	1.223	0.000	0.000	57.000	TR55	13.52	4.931
	$\Sigma$	<b>248.850</b>						<b>13.52</b>	<b>4.931</b>
#2	1	438.460	1.605	0.000	0.000	80.000	TR55	202.93	44.768
	$\Sigma$	<b>438.460</b>						<b>202.93</b>	<b>44.768</b>
#4	$\Sigma$	<b>936.680</b>						<b>9.59</b>	<b>19.538</b>

## ***Subwatershed Sedimentology Detail:***

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.150	100.00	36.40	0.3500	1.0000	1	288.6	69,863	22.57	15.25
	$\Sigma$							<b>288.6</b>	<b>69,863</b>	<b>22.57</b>	<b>15.25</b>
<b>#5</b>	$\Sigma$							<b>18.9</b>	<b>6,670</b>	<b>0.00</b>	<b>0.00</b>
#3	1	0.150	100.00	30.00	0.0030	1.0000	1	2.4	543	0.17	0.12
	$\Sigma$							<b>2.4</b>	<b>543</b>	<b>0.17</b>	<b>0.12</b>
#2	1	0.240	100.00	36.40	0.9000	1.0000	1	21,938.0	460,667	187.54	126.42
	$\Sigma$							<b>21,938.0</b>	<b>460,667</b>	<b>187.54</b>	<b>126.42</b>
#4	$\Sigma$							<b>172.1</b>	<b>18,985</b>	<b>0.21</b>	<b>0.10</b>

## **Bingham Single Bench Model**

***This scenario models a single 80' wide bench tthat is 2' deep with  
185' of waste rock face draining to it.***

Lizel Spencer

## ***General Information***

### ***Storm Information:***

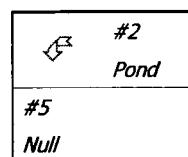
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	2.090 inches

### ***Particle Size Distribution:***

Size (mm)	Eroded Material
19.0000	100.000%
9.5000	97.700%
4.7500	90.600%
2.0000	81.900%
0.8500	71.700%
0.4250	63.600%
0.2500	57.500%
0.1500	51.500%
0.0750	42.900%
0.0638	39.480%
0.0460	36.300%
0.0331	33.110%
0.0214	29.290%
0.0125	27.380%
0.0089	25.470%
0.0063	24.200%
0.0045	21.010%
0.0031	17.830%
0.0022	15.280%
0.0012	13.370%

***Structure Networking:***

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#2	=>	#5	0.000	0.000	Bench
Null	#5	=>	End	0.000	0.000	



***Structure Summary:***

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)	
#2	In Out	25.500	25.500	18.03 0.00	1.31 0.00	1,740.7 1,740.7	1,148,420 0	669.95 0.00	383.67 0.00
#5		0.000	25.500	0.00	0.00	1,740.7	1	0.00	0.00

***Particle Size Distribution(s) at Each Structure******Structure #2 (Bench):***

Size (mm)	In	Out
19.0000	100.000%	0.000%
9.5000	97.700%	0.000%
4.7500	90.600%	0.000%
2.0000	81.900%	0.000%
0.8500	71.700%	0.000%
0.4250	63.600%	0.000%
0.2500	57.500%	0.000%
0.1500	51.500%	0.000%
0.0750	42.900%	0.000%
0.0638	39.480%	0.000%
0.0460	36.300%	0.000%
0.0331	33.110%	0.000%
0.0214	29.290%	0.000%
0.0125	27.380%	0.000%
0.0089	25.470%	0.000%
0.0063	24.200%	0.000%
0.0045	21.010%	0.000%
0.0031	17.830%	0.000%
0.0022	15.280%	0.000%
0.0012	13.370%	0.000%

***Structure #5:***

Size (mm)	In/Out
19.0000	0.000%
9.5000	0.000%
4.7500	0.000%
2.0000	0.000%
0.8500	0.000%
0.4250	0.000%
0.2500	0.000%
0.1500	0.000%
0.0750	0.000%
0.0638	0.000%

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Size (mm)	In/Out
0.0460	0.000%
0.0331	0.000%
0.0214	0.000%
0.0125	0.000%
0.0089	0.000%
0.0063	0.000%
0.0045	0.000%
0.0031	0.000%
0.0022	0.000%
0.0012	0.000%

***Structure Detail:***Structure #2 (Pond)*Bench*

Pond Inputs:

Initial Pool Elev:	6,500.10 ft
Initial Pool:	0.01 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

*\*No sediment capacity defined*Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
6000.00	6,501.99

Pond Results:

Peak Elevation:	6,500.76 ft
H'graph Detention Time:	0.00 hrs
Pond Model:	CSTRS
Dewater Time:	0.00 days
Trap Efficiency:	0.00 %

*Dewatering time is calculated from peak stage to lowest spillway*Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
6,500.00	0.001	0.000	0.000	Top of Sed. Storage
6,500.10	0.284	0.010	0.000	
6,500.50	1.872	0.395	0.000	
6,500.76	4.124	1.321	0.000	0.00 Peak Stage
6,501.00	5.500	2.158	0.000	
6,501.50	8.027	5.520	0.000	
6,501.99	10.961	10.156	0.000	Spillway #1
6,502.00	11.020	10.263	17.875	

Detailed Discharge Table

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Elevation (ft)	Broad- crested Weir (cfs)	Combined Total Discharge (cfs)
6,500.00	0.000	0.000
6,500.10	0.000	0.000
6,500.50	0.000	0.000
6,501.00	0.000	0.000
6,501.50	0.000	0.000
6,501.99	0.000	0.000
6,502.00	17.875	17.875

Structure #5 (Null)

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## ***Subwatershed Hydrology Detail:***

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	25.500	0.100	0.000	0.000	80.000	TR55	18.03	1.312
	$\Sigma$	<b>25.500</b>						<b>18.03</b>	<b>1.312</b>
#5	$\Sigma$	<b>25.500</b>						<b>0.00</b>	<b>0.000</b>

## ***Subwatershed Sedimentology Detail:***

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.240	210.00	54.00	0.9000	1.0000	1	1,740.7	1,148,420	669.95	383.67
	$\Sigma$							<b>1,740.7</b>	<b>1,148,420</b>	<b>669.95</b>	<b>383.67</b>
#5	$\Sigma$							<b>1,740.7</b>	<b>1</b>	<b>0.00</b>	<b>0.00</b>

FHWA Urban Drainage Design Program, HY-22  
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Circular X-Section  
Date: 08/27/2009

Project No. :  
Project Name.:Kennecott Bingham Canyon Study  
Computed by :URS Corp

Project Description  
Lower Pond Discharge Pipe Sizing  
Scenario 2

INPUT PARAMETERS

1. Pipe Slope (ft/ft)	0.0450
2. Pipe Diameter (in)	15.0
3. Manning's Coefficient	0.015
4. Discharge (cfs)	2.400

OUTPUT RESULTS

Partial Flow Conditions

Depth of Flow (ft)	0.38
Velocity (ft/sec)	7.69

FHWA Urban Drainage Design Program, HY-22  
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Circular X-Section  
Date: 08/27/2009

Project No. :  
Project Name.:Kennecott Bingham Canyon Study  
Computed by :URS Corp

Project Description  
Lower Pond Discharge Pipe Sizing  
Scenario 1

INPUT PARAMETERS

1. Pipe Slope (ft/ft)	0.0450
2. Pipe Diameter (in)	15.0
3. Manning's Coefficient	0.015
4. Discharge (cfs)	4.100

OUTPUT RESULTS

Partial Flow Conditions

Depth of Flow (ft)	0.51
Velocity (ft/sec)	8.80

FHWA Urban Drainage Design Program, HY-22  
HYDRAULIC PARAMETERS OF OPEN CHANNELS

Circular X-Section  
Date: 08/28/2009

Project No. :  
Project Name.:kennecott Bingham Canyon Study  
Computed by :URS Corp

Project Description  
Upper Pond Discharge Pipe Sizing

INPUT PARAMETERS

1. Pipe Slope (ft/ft)	0.0100
2. Pipe Diameter (in)	15.0
3. Manning's Coefficient	0.015
4. Discharge (cfs)	8.200

OUTPUT RESULTS

Pressure Flow Conditions

Depth of Flow (ft)	1.25
Velocity (ft/sec)	6.68

**Particle-Size Analysis of Soils with hydrometer**  
 (ASTM D422)

**IGES**  
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**Project: URS**

**No: M00100-085 (24585077)**

**Location: KUCC Runoff**

**Date: 6/30/2009**

**By: JDF/BRR**

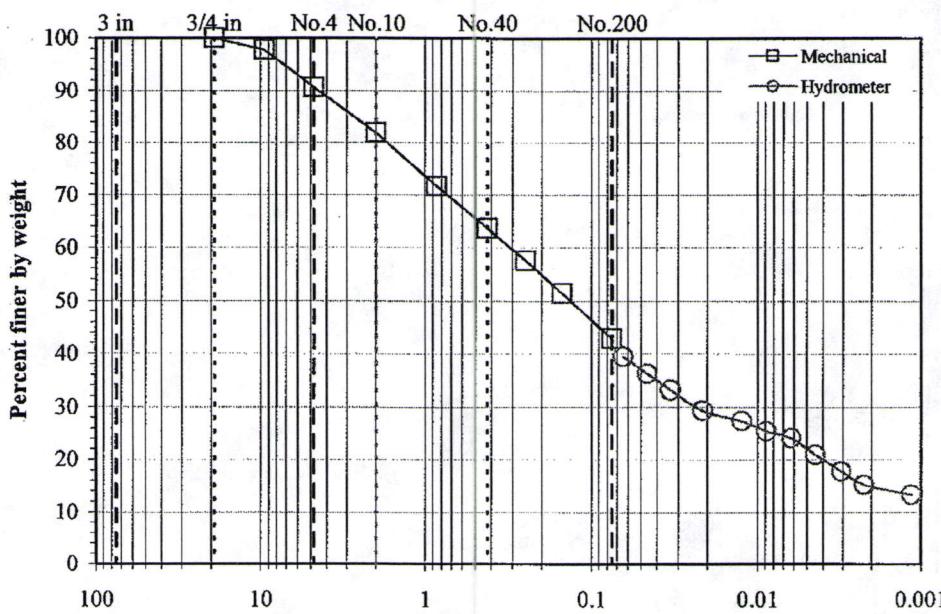
**Boring No.:**

**Sample: 1**

**Depth: Surface**

**Description: Brown clayey sand with gravel**

				Moisture data C.F.(+3/8") S.F.(-3/8") Hyd.(-No.10)			
Split sieve:	Yes			Moist soil + tare (g):	315.70	1855.50	77.53
Split sieve:	3/8"			Dry soil + tare (g):	311.94	1681.91	76.21
		Moist	Dry	Tare (g):	152.70	408.50	30.29
Total sample wt. (g):	7944.7	7007.39		Moisture content (%):	2.36	13.63	2.87
+3/8" Coarse fraction (g):	162.8	159.04		Hydrometer data			
-3/8" Split fraction (g):	226.16	199.03		Hyd. split:	No.10		Slope: -0.164
Hydrometer fraction (g):	66.16	64.31		Gs:	2.65	Assumed	Intercept: 16.3
Split fraction:	0.977			Composite corr.:	5		$\alpha$ : 1.00
				Dispersion period (min):	15		Hyd. fraction: 81.91
						Dispersion device:	Air-jet
Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	Elapsed time (min)	Temp. (°C)	Hydrometer Reading	Grain Size (mm) % Soil in Suspension
12"	-	300	-	0.5	18	36	0.06379 39.48
8"	-	200	-	1	18	33.5	0.04599 36.30
6"	-	150	-	2	18	31	0.03313 33.11
4"	-	100	-	5	18	28	0.02141 29.29
3"	-	75	-	15	18	26.5	0.01249 27.38
1.5"	-	37.5	-	30	18.6	25	0.00886 25.47
3/4"	-	19	100.0	60	18.9	24	0.00628 24.20
3/8"	159.04	9.5	97.7	<=Split	120	19.9	21.5 0.00446 21.01
No.4	14.50	4.75	90.6		250	21.4	19 0.00308 17.83
No.10	32.22	2	81.9	<=Split hyd.	479	22.7	17 0.00222 15.28
No.20	8.02	0.85	71.7		1824	22.8	15.5 0.00115 13.37
No.40	14.38	0.425	63.6				
No.60	19.15	0.25	57.5				
No.100	23.91	0.15	51.5				
No.200	30.62	0.075	42.9				



Entered by: \_\_\_\_\_  
 Reviewed: \_\_\_\_\_

Grain size (mm)

Z:\PROJECTS\00100\_URS085\_KUCC\_Runoff\GSDHYDv1.xls]

**Particle-Size Analysis of Soils with hydrometer**

(ASTM D422)



**Project: URS**

No: M00100-085 (24585077)

Location: KUCC Runoff

Date: 6/30/2009

By: JDF/BRR

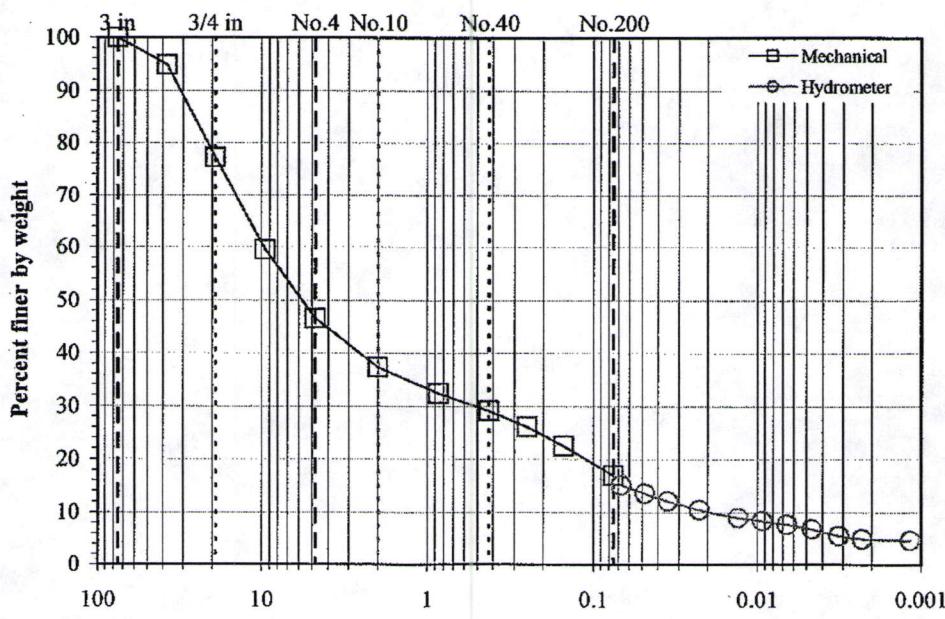
**Boring No.:**

Sample: 2

Depth: Surface

Description: Reddish brown clayey gravel with sand

		Moisture data C.F.(+3/8") S.F.(-3/8") Hyd.(-No.10)		
Split sieve:	Yes	Moist soil + tare (g):	1012.70	2000.20
Split sieve:	3/8"	Dry soil + tare (g):	1000.79	1950.62
		Tare (g):	154.00	310.60
Total sample wt. (g):	10554.8	Moisture content (%):	1.41	3.02
+3/8" Coarse fraction (g):	4242.1	Hydrometer data		
-3/8" Split fraction (g):	315.80	Hyd. split:	No.10	Slope: -0.164
Hydrometer fraction (g):	60.74	Gs:	2.65	Intercept: 16.3
Split fraction:	0.594	Assumed		$\alpha$ : 1.00
		Composite corr.:	5	Hyd. fraction: 37.30
		Dispersion period (min):	15	Dispersion device: Air-jet
Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
12"	-	300	-	Elapsed time (min)
8"	-	200	-	1
6"	-	150	-	2
4"	-	100	-	5
3"	-	75	100.0	15
1.5"	535.86	37.5	94.8	30
3/4"	2351.72	19	77.2	60
3/8"	4183.26	9.5	59.4	<=Split
No.4	66.82	4.75	46.5	120
No.10	114.15	2	37.3	250
No.20	7.90	0.85	32.4	<=Split hyd.
No.40	13.36	0.425	29.0	471
No.60	18.05	0.25	26.1	1816
No.100	23.96	0.15	22.5	
No.200	32.77	0.075	17.0	
				Temp. (°C)
				Hydrometer Reading
				Grain Size (mm)
				% Soil in Suspension



Entered by: \_\_\_\_\_

Reviewed: \_\_\_\_\_

**Particle-Size Analysis of Soils with hydrometer**

(ASTM D422)



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**Project: URS**

**No: M00100-086 (24585077)**

**Location: KUCC Liner**

**Date: 8/17/2009**

**By: BRR**

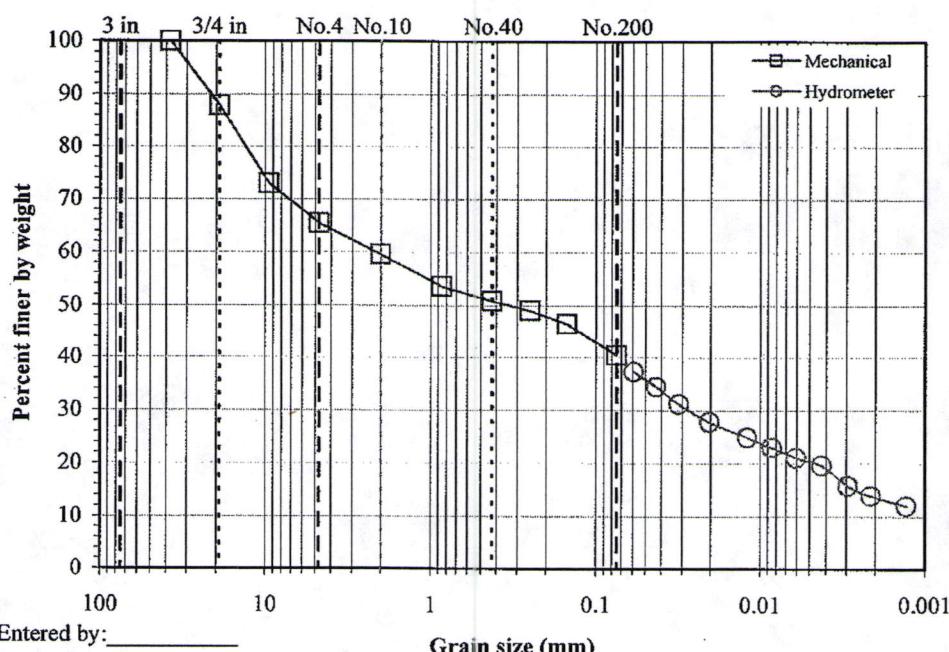
**Boring No.:**

**Sample: 8-10-09**

**Depth:**

**Description: Brown clayey gravel with sand**

				Moisture data			C.F.(+3/8")	S.F.(-3/8")	Hyd.(-No.10)
Split sieve:	Yes			Moist soil + tare (g):	590.06	431.29	100.22		
Split sieve:	3/8"			Dry soil + tare (g):	589.10	425.30	98.26		
		Moist	Dry	Tare (g):	211.75	141.75	30.29		
Total sample wt. (g):	5729.1	5638.35		Moisture content (%):	0.25	2.11	2.88		
+3/8" Coarse fraction (g):	1530.3	1526.42		<u>Hydrometer data</u>			Slope: -0.164		
-3/8" Split fraction (g):	850.12	832.53		Hyd. split:	No.10		Intercept:	16.3	
Hydrometer fraction (g):	64.01	62.22		Gs:	2.65	Assumed	$\alpha$ :	1.00	
Split fraction:	0.729			Composite corr.:	6		Hyd. fraction:	59.60	
				Dispersion period (min):	15		Dispersion device:	Air-jet	
Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	Elapsed time (min)	Temp. (°C)	Hydrometer Reading	Grain Size (mm)	% Soil in Suspension	
12"	-	300	-	0.5	17.9	45	0.05918	37.36	
8"	-	200	-	1	17.9	42	0.04298	34.49	
6"	-	150	-	2	17.9	38.5	0.03131	31.14	
4"	-	100	-	5	17.9	35	0.02036	27.78	
3"	-	75	-	15	18.1	32	0.01200	24.91	
1.5"	-	37.5	100.0	30	18.7	30	0.00854	22.99	
3/4"	689.05	19	87.8	60	19.5	28	0.00607	21.08	
3/8"	1526.42	9.5	72.9	<=Split		120	21.2	0.00424	19.64
No.4	84.93	4.75	65.5	<=Split hyd.		250	23.5	0.00294	15.81
No.10	152.10	2	59.6			464	25.4	0.00214	13.89
No.20	6.34	0.85	53.5			1412	21.4	0.00130	11.98
No.40	9.15	0.425	50.8						
No.60	11.05	0.25	49.0						
No.100	13.76	0.15	46.4						
No.200	20.01	0.075	40.4						



Entered by: \_\_\_\_\_  
Reviewed: \_\_\_\_\_

**Liquid Limit, Plastic Limit, and Plasticity Index of Soils**  
 (ASTM D4318)

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**Project: URS**

**No: M00100-086 (24585077)**

**Location: KUCC Liner**

**Date: 8/17/2009**

**By: NB**

**Boring No.:**

**Sample: 8-10-09**

**Depth:**

**Description: Brown clay**

**Preparation method: Air Dry**

**Liquid limit test method: Multipoint**

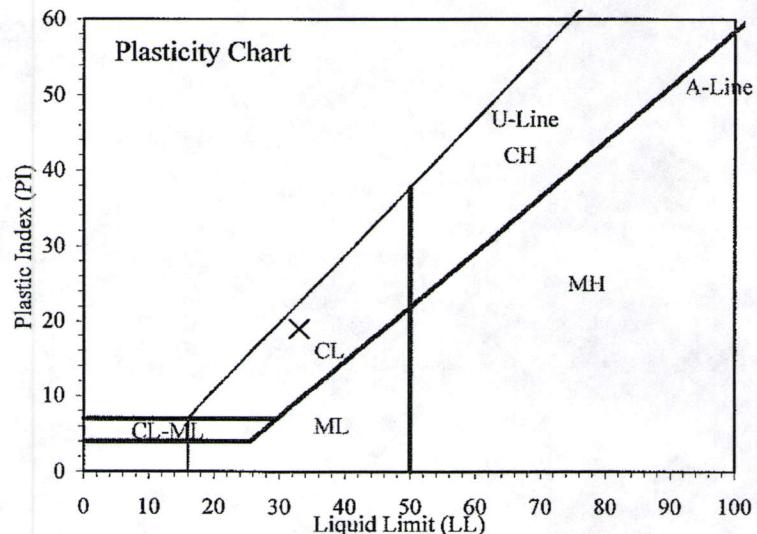
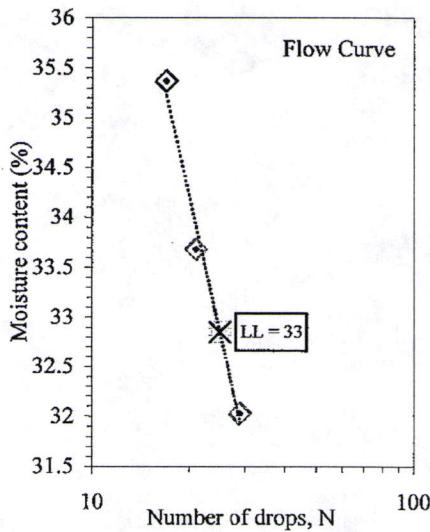
**Plastic Limit**

Determination No	1	2				
Wet Soil + Tare (g)	8.67	8.84				
Dry Soil + Tare (g)	7.80	7.91				
Moisture Loss (g)	0.87	0.93				
Tare (g)	1.38	1.39				
Dry Soil (g)	6.42	6.52				
Moisture Content, w (%)	13.55	14.26				

**Liquid Limit**

Determination No	1	2	3			
Number of Drops, N	29	21	17			
Wet Soil + Tare (g)	13.82	16.59	14.84			
Dry Soil + Tare (g)	10.80	12.76	11.31			
Moisture Loss (g)	3.02	3.83	3.53			
Tare (g)	1.37	1.39	1.33			
Dry Soil (g)	9.43	11.37	9.98			
Moisture Content, w (%)	32.03	33.69	35.37			
One-Point LL (%)	33	33				

<b>Liquid Limit, LL (%)</b>	33
<b>Plastic Limit, PL (%)</b>	14
<b>Plasticity Index, PI (%)</b>	19



Entered by: \_\_\_\_\_  
 Reviewed: \_\_\_\_\_